V12064

JVC

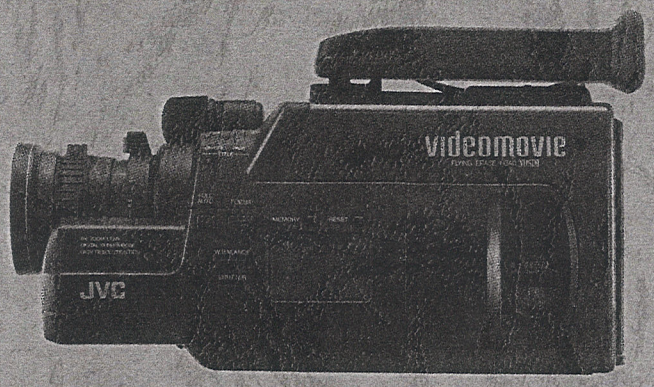
SERVICE MANUAL

VHS VIDEO MOVIE

GR-60U

VHS C

HQ High Quality



SPECIFICATIONS

Format		: VHS standard
Power source		: DC 9.6 V⎓
Power consumption		: 8.0 W (Ave.), 1.1 A (MAX.)
Signal system		: NTSC-type
Recording system		: Luminance: FM recording Color: Converted sub-carrier direct recording Conforms to VHS standard
Cassette		: VHS C cassette
Tape speed	(SP)	: 33.35 mm/sec (1-5/16 ips)
	(EP)	: 11.12 mm/sec (7/16 ips)
Recording time Max.		
	(SP)	: 20 minutes (with TC-20 cassette)
	(EP)	: 60 minutes (with TC-20 cassette)

VIDEO

Output	: 1 Vp-p, 75 ohms, unbalanced (via AV OUT connector)
S/N ratio	: More than 40 dB (with Rohde & Schwarz noise meter)

AUDIO

Output	: –6 dBs, 1 k-ohm (via AV OUT connector)
Microphone input	: –68 dBs, high impedance, unbalanced
Pickup	: 1/2"-format CCD
Minimum required illumination	: 8 lux (0.8 fc) (at F/1.4)
Illumination range	: 8 – 100,000 lux (0.8 – 9300 fc)
Lens	: F/1.4 f = 8.5 – 68 mm. 8 : 1 power zoom lens with auto iris control and auto macro range, filter diameter 52 mm
Viewfinder	: Electronic viewfinder with 0.6" black/white CRT
Selectable high-speed shutter	: Switchable (1/250, 1/500, 1/1000 sec.)
Color temperature switching	: Switchable (3,200 K/4,500 K/5,500 K)
White balance adjustment	: Full-auto/preset standard
Operating temperature	: 0° C to +40° C (32° F to 104° F)
Operating humidity	: 35% to 80%
Storage temperature	: –20° C to +50° C (–4° F to 122° F)
Weight	: 1.2 Kg (2.6 lbs) (with viewfinder)
Dimensions	: 11(W) x 150(H) x 253(D) mm (4-3/8" x 5-15/16" x 10-1/16") (incl. viewfinder)

AA-V6U SPECIFICATIONS

Power requirement	: USA and canada: AC 120 V∿, 60 Hz Other countries: AC-110 – 240 V∿, 50/60 Hz
Power consumption	: 23 watts
Output	: DC 14 V⎓ 1.1 A (Charge) DC 9.6 V⎓ 1.2 A (VideoMovie)
Charging system	: Constant current, peak detection, timer controlled
Dimensions	: 150(W) x 42(H) x 69(D) mm (5-15/16" x 1-11/16" x 2-3/4")
Weight	: Approx. 360 g (0.8 lbs)

C-P5U SPECIFICATIONS

Type	: VHS cassette adapter
Dimensions	: 188(W) x 25(H) x 104(D) mm (7-7/16" x 1" x 4-1/8")
Weight	: Approx. 240 g (0.53 lb)
Accessory	: "AA"-size battery x 1

RF-V3U SPECIFICATIONS

VHF output channel	: Channel 3 or 4 (switchable)
Initial channel setting	: Channel 3
Power source	: DC 8 V⎓ 20 mA (from VideoMovie)
Dimensions	: 52(W) x 80(H) x 24(D) mm excl. cable (2-1/16" x 3-3/16" x 1")
Cable length	: 2.5 m (8 ft)
Weight	: Approx. 160 g (0.35 lbs)

Provided accessories:

AC power adapter/battery charger	AA-V6U
Cassette adapter	C-P5U
Battery pack	BN-V6GU
RF unit	RF-V3U
Cassette tape	TC-20
A/V output cable	VC-V826U

Shoulder strap	Electric viewfinder	Lens cap
Lenshood	Battery for clock operation	Title holder

For optional accessories, refer to pages 31 and 32.

Specifications shown are for SP mode unless otherwise specified.
Design and specifications subject to change without notice.

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No. 86066
May 1989

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Important Safety Precautions

Prior to shipment from the factory, JVC products are strictly inspected to conform with the recognized product safety and electrical codes of the countries in which they are to be sold. However, in order to maintain such compliance, it is equally important to implement the following precautions when a set is being serviced.

● Precautions during Servicing

1. Locations requiring special caution are denoted by labels and inscriptions on the cabinet, chassis and certain parts of the product. When performing service, be sure to read and comply with these and other cautionary notices appearing in the operation and service manuals.

2. Parts identified by the ⚠ symbol and shaded (▒) parts are critical for safety.
   Replace only with specified part numbers.
   Note: Parts in this category also include those specified to comply with X-ray emission standards for products using cathode ray tubes and those specified for compliance with various regulations regarding spurious radiation emission.

3. Fuse replacement caution notice.
   Caution for continued protection against fire hazard.
   Replace only with seme type and rated fuse(s) as specified.

4. Use specified internal wiring. Note especially:
   1) Wires covered with PVC tubing
   2) Double insulated wires
   3) High voltage leads

5. Use specified insulating materials for hazardous live parts. Note especially:
   1) Insulation Tape
   2) PVC tubing
   3) Spacers
   4) Insulation sheets for transistors
   5) Barrier

6. When replacing AC primary side components (transformers, power cords, noise blocking capacitors, etc.) wrap ends of wires securely about the terminals before soldering.

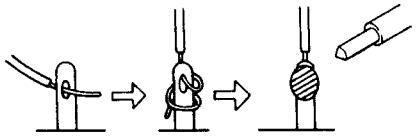


Fig. 1

7. Observe that wires do not contact heat producing parts (heat-sinks, oxide metal film resistors, fusible resistors, etc.)

8. Check that replaced wires do not contact sharp edged or pointed parts.

9. When a power cord has been replaced, check that 10—15 kg of force in any direction will not loosen it.

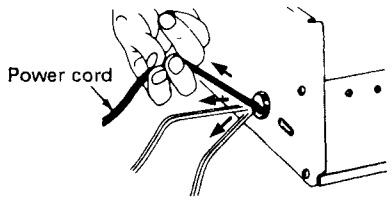


Fig. 2

10. Also check areas surrounding repaired locations.

11. Products using cathode ray tubes (CRTs)
    In regard to such products, the cathode ray tubes themselves, the high voltage circuits, and related circuits are specified for compliance with recognized codes pertaining to X-ray emission. Consequently, when servicing these products, replace the cathode ray tubes and other parts with only the specified parts. Under no circumstances attempt to modify these circuits. Unauthorized modification can increase the high voltage value and cause X-ray emission from the cathode ray tube.

12. Crimp type wire connector
    In such cases as when replacing the power transformer in sets where the connections between the power cord and power transformer primary lead wires are performed using crimp type connectors, if replacing the connectors is unavoidable, in order to prevent safety hazards, perform carefully and precisely according to the following steps.

    1) **Connector part number** : E03830-001
    2) **Required tool** : Connector crimping tool of the proper type which will not damage insulated parts.
    3) **Replacement procedure**
       (1) Remove the old connector by cutting the wires at a point close to the connector.
       Important : Do not reuse a connector (discard it).

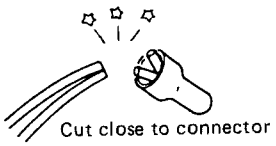


Fig. 3

(2) Strip about 15 mm of the insulation from the ends of the wires. If the wires are stranded, twist the strands to avoid frayed conductors.

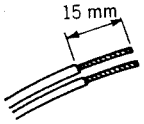


Fig. 4

(3) Align the lengths of the wires to be connected. Insert the wires fully into the connector.

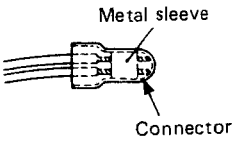


Fig. 5

(4) As shown in Fig. 6, use the crimping tool to crimp the metal sleeve at the center position. Be sure to crimp fully to the complete closure of the tool.

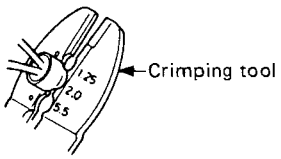


Fig. 6

(5) Check the four points noted in Fig. 7.

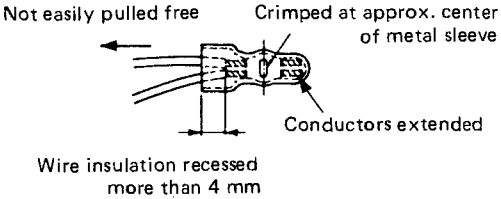


Fig. 7

● Safety Check after Servicing

Examine the area surrounding the repaired location for damage or deterioration. Observe that screws, parts and wires have been returned to original positions, Afterwards, perform the following tests and confirm the specified values in order to verify compliance with safety standards.

1. Insulation resistance test

Confirm the specified insulation resistance or greater between power cord plug prongs and externally exposed parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

2. Dielectric strength test

Confirm specified dielectric strength or greater between power cord plug prongs and exposed accessible parts of the set (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.). See table 1 below.

3. Clearance distance

When replacing primary circuit components, confirm specified clearance distance (d), (d') between soldered terminals, and between terminals and surrounding metallic parts. See table 1 below.

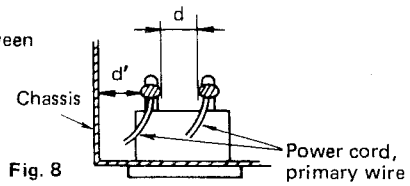


Fig. 8

4. Leakage current test

Confirm specified or lower leakage current between earth ground/power cord plug prongs and externally exposed accessible parts (RF terminals, antenna terminals, video and audio input and output terminals, microphone jacks, earphone jacks, etc.).

Measuring Method: (Power ON)

Insert load Z between earth ground/power cord plug prongs and externally exposed accessible parts. Use an AC voltmeter to measure across both terminals of load Z. See figure 9 and following table 2.

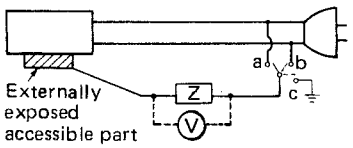


Fig. 9

5. Grounding (Class I model only)

Confirm specified or lower grounding impedance between earth pin in AC inlet and externally exposed accessible parts (Video in, Video out, Audio in, Audio out or Fixing screw etc.).

Measuring Method:

Connect milli ohm meter between earth pin in AC inlet and exposed accessible parts. See figure 10 and grounding specifications.

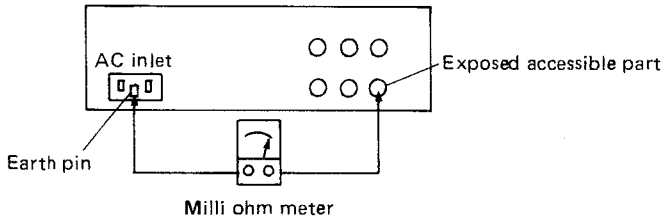


Fig. 10

Grounding Specifications

Region	Grounding Impedance (Z)
USA & Canada	Z ≦ 0.1 ohm
Europe & Australia	Z ≦ 0.5 ohm

AC Line Voltage	Region	Insulation Resistance (R)	Dielectric Strength	Clearance Distance (d), (d')
100 V	Japan	R ≧ 1 MΩ/500 V DC	AC 1 kV 1 minute	d, d' ≧ 3 mm
100 to 240 V			AC 1.5 kV 1 minute	d, d' ≧ 4 mm
110 to 130 V	USA & Canada	—	AC 900 V 1 minute	d, d' ≧ 3.2 mm
110 to 130 V 200 to 240 V	Europe & Australia	R ≧ 10 MΩ /500 V DC	AC 3 kV 1 minute (Class II) AC 1.5 kV 1 minute (Class I)	d ≧ 4 mm d' ≧ 5 mm (Power cord) d' ≧ 6 mm (Primary wire)

Table 1 Specifications for each region

AC Line Voltage	Region	Load Z	Leakage Current (i)	a, b, c
100 V	Japan	1 kΩ	i ≦ 1 mA rms	Exposed accessible parts
110 to 130 V	USA & Canada	0.15 μF, 1.5 kΩ	i ≦ 0.5 mA rms	Exposed accessible parts
110 to 130 V 220 to 240 V	Europe & Australia	2 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Antenna earth terminals
		50 kΩ	i ≦ 0.7 mA peak i ≦ 2 mA dc	Other terminals

Table 2 Leakage current specifications for each region

Note: These tables are unofficial and for reference only. Be sure to confirm the precise values for your particular country and locality.

JVC

INSTRUCTIONS

GR-60

CAMERA-RECORDER/PLAYER

Specificelly for the GR-60U/AA-V6U

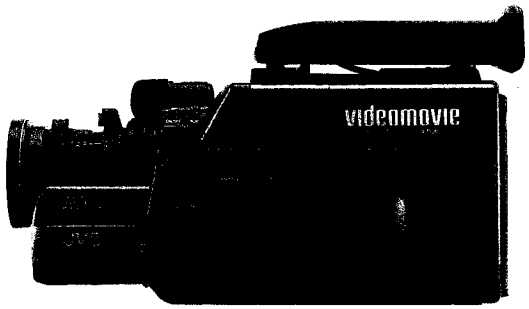
videomovie

VHS C

HQ High Quality

CCD Charge Coupled Device

AF AUTO FOCUS



For Customer Use:
Enter below the Serial Nos. of the GR-60U VideoMovie and the AA-V6U Battery Charger.
The former is located on the bottom of the GR-60U and the latter, on the bottom of the AA-V6U.

Model No.	GR-60U	AA-V6U
Serial No.		

YU30052-79

Thank you for purchasing the JVC GR-60U Auto-focus VideoMovie. Weighing only 2.6 lbs, the Auto-focus VideoMovie comprises an auto-focus CCD video camera, and recording and playback functions in a single compact unit for the most convenient live recording capability available today. The Auto-focus VideoMovie uses the VHS recording system and compact video cassettes to make recordings compatible with all VHS recorders. It can also be connected to your television set for direct playback of cassettes; no additional video equipment is required.

Before use, read this instruction booklet carefully for obtaining the best results from your new unit. Diagrams are on the reverse side of this page. Fold it out and keep it opened so that you can refer to the diagrams when you are reading this booklet.

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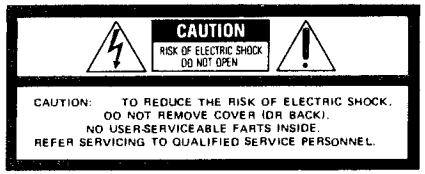

The lightning flash with arrowhead symbol, within an equilateral triangle, is intanded to alert the user to the presanca of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

The AA-V6U AC Power Adapter/Charger should be used with:
AC 120 V∿, 60 Hz in the USA and Canada,
AC 110–240 V∿, 50/60 Hz in other countries.
Caution:
To prevent electric shocks and fire hazards do NOT use any other power source.

CAUTION (applies to the AA-V6U)
TO PREVENT ELECTRIC SHOCK DO NOT USE THIS POLARIZED PLUG WITH AN EXTENSION CORD, RECEPTABLE OR OTHER OUTLET UNLESS THE BLADES CAN BE FULLY INSERTED TO PREVENT BLADE EXPOSURE.

Warning on Lithium battery
The battery used in this device may present a fire or chemical burn hazard if misused. Do not recharge, disassemble, heat above 100°C (212°F) or incinerate.
Replace battery with Panasonic (Matsushita Electric CR 2025, use of another battery may present a risk of fire or explosion.
- Dispose of used battery promptly.
- Keep away from children.
- Do not disassemble and do not dispose of in fire.

WARNING:
TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS UNIT TO RAIN OR MOISTURE.

This equipment should be used with DC 9.6 V ⎓ only.
CAUTION:
To prevent electric shocks and fire hazards, do NOT use any other power source.

NOTES:
- The rating plate (serial number plate) and safety caution of the main unit are on its bottom.
- Tbe rating plate (serial number plate) of the viewfinder is on its bottom.
- The rating plate (serial number plate) of the AC power adapter/charger is on its bottom.

The provided viewfinder is the VF-V40U. Do not use any other viewfinder with the GR-60U.

VHSC HQ High Quality

- VideoMovie is designed exclusively for the VHSC video cassette. Only cassettes marked VHSC can be used with this unit.
- HQ VHS is compatible with existing VHS equipment.

JVC COMPANY OF AMERICA
Division of US JVC CORP.
41 Slater Drive, Elmwood Park, New Jersey 07407

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FEATURES

- Allows direct playback with no additional eomponents necessary.
- Flying erase head for precise, quality assemble/insert editing.
- Insert editing function.
- Audio dubbing facility.
- Retake function for quick re-recording of scenes when necessary.
- Ultra compact and ultra-lightweight a mere 1.2 kg (2.6 lbs).
- 4-Page Digital Superimpose function for mixing titles or illustrations into a live recording.
- Multiple-speed electronic shutter for sharp clear playback of fast-action shots — 1/1000, 1/500, 1/250, 1/60 (standard)-second.
- Newly developed high resolution 1/2" field-storage type CCD (Charge Coupled Device) pickup.
- One-button full-auto operation of focus, exposure, and white balance.
- Powerful, two-speed 8:1 power zoom.
- HQ (High Quality) System for superlative picture quality.
- High-sensitivity/low-lag design: allows shooting in light as low as 8 lux.
- Image Sensing auto-focus.
- Automatic Color Tracking white balance with three preset positions.
- Backlight compensation button.
- Audio/video feder linked to start/stop trigger.
- Animation function using the Remote Control Unit RM-V15U (optional).
- Large easy-read LCD (Liquid Crystal Display).
- Ultra-compact adjustable electronic viewfinder (monochrome CRT, 0.6-inch screen) with diopter control, also for instant on-the-spot playback.
- Selectahle automatic date recording function.
- Recordable date/time display.
- Elapsed recording time counter.
- Second recording start/stop button provided on top of GR-60U.
- Dubbing mode switch provided for hest results when dubhing.
- Selectable quick review function.
- One-button recording standby mechanism.
- Master Edit Control system: allows control of both GR-60U and connected designated JVC VCR using GR-60U's controls, and preroll editing for edits free of transition-point gaps and noise.
- Shuttle Search in both directions.
- Unique grip battery doubles as palm grip, saving weight and space.
- Ergonomic design with palm grip and thumh rest for trigger control.
- Trigger alarm system for preventing recording errors.
- Three-way power supply flexibility: battery pack, AC power adapter, and car battery.

The GR-60U is designed to be used with NTSC-type color television signals. It cannot be used for playback with a television of a different standard. However, live recording and viewfinder playback are possible anywhere. Use the BN-V5GU/BN-V6GU/BN-V7GU battery packs and, to recharge them, the provided multivoltage AC power adapter/battery charger. (An appropriate conversion adapter may be necessary to accommodate different designs of AC outlets in different countries.)

PRECAUTIONS

For safety, strictly observe the following instructions.
- Do not disassemble or modify the unit.
- Prevent inflammables, water and metallic objects from entering the unit.
- Do not use the unit when there is lightning in the vicinity. Disconnect the power cable of connected equipment.

Avoid using the unit under the following conditions:
- Places subject to excessive humidity or dust.
- Near appliances generating strong magnetic or electric fields (speakers, broadcasting antennas, etc.).
- Places subject to soot or steam such as near a cooking stove.
- Places subject to excessive shock or vibration.
- Near a television set (rolling pictures or howling might result).
- Extremely hot places.

Do not expose the unit to high temperatures over 50°C (122°F) for long periods.

If the unit should be subjected to direct sunlight, or left in a closed car in summer, or placed near a heater, the CCD and the auto-focus sensor may deteriorate and the cabinet mey become deformed. Furthermore, this also may cause the transistors and other electronic and mechanical parts to malfunction. Remember the following:
- Do not leave the unit in places of over 50°C (122°F).
- Do not use the unit in places of over 40°C (104°F).
- Do not use the unit in places of below 0°C (32°F).
- Protect the unit from excessively dry or excessively humid conditions (below 35% or above 80% humidity).
- For long storage, select a place between -20°C (-4°F) and 30°C (86°F).

Take special care for protection of the unit.
- Do not allow the unit to become wet.
- Do not leave the unit in closed cars on hot summer days.
- Take special care not to drop the unit or strike it against hard objects. Protect from shocks during transportation.

Make it a rule to observe the following instruetions.
- Do not remove the battery pack or disconnect other power supply units during recording or playback before pressing the POWER switch to OFF. If not observed, this will cause tape damage.
- When the unit is not in use, remove the battery pack.

Keep the lens and viewfinder eyepiece always clean.
- When the lens is dirty or dusty, blow it off first and then gently wipe with a soft brush or lens cleaning paper.
- The lens is likely to become moldy if left dirty.

Be careful not to damage the CCD.
- Do not keep the lens directed at extremely bright objects such as the sun or other light sources for long periods. Although the CCD is less susceptible to such burn than a tube would be, caution should be exercised when using this unit. Most importantly, the lens should be capped except while actually shooting.
- Do not direct the eyepiece of the viewfinder at the sun.

Auto-focus information.
- Do not touch the focus ring while the auto-focus mechanism is in operation as this could damage the auto-focus mechanism.
- When a filter or a special-effect ens is to be attached to the end of the lens, be sure to turn power off or switch from the Auto-focus mode to the Manual mode. NEVER attempt to attach a filter or lens while the auto-focus mechanism is operating as this will result in malfunctioning. (If a teleconversion or wide-angle conversion lens is attached, the auto-focus mode cannot be used.)

Handle the unit carefully.
- Protect the microphone from excessive shocks.
- Do not carry the unit by holding it only by the viewfinder.

Moisture condensation prevents use of the unit.
- You have observed that pouring a cold liquid into a glass will cause drops of water to form on the glass's outer surface. This same phenomenon occurs on the head drum of a video recorder when the recorder is moved from a cool place to a warm place, after heating in a cold room, under extremely humid conditions or in a place directly subjected to the cool air from an air conditioner.
- Moisture on the head drum can cause severe damage to the video tape, and can lead to internal damage to the recorder itself.
- If moisture condensation occurs on the head drum, a condensation warning appears on the LCD and the unit enters the Stop mode, unable to function. In such a case, wait for a few hours until the indicator disappears.

Maintenance
- When the cabinet is dusty, clean by gently wiping with a soft cloth.
- Avoid the use of strong cleaning agents such as benzene or alcohol as they may damage the cabinet.
- Cleaning should be done only after the battery pack has been removed or other power units have been disconnected.

Serious malfunctioning

If malfunctioning occurs, stop using the unit immediately and consult your local JVC Service Center.

INFORMATION

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient the receiving antenna;
Relocate this equipment with respect to the receiver;
Move this equipment away from the receiver;
Plug this equipment into a different outlet so that this equipment and receiver are on different branch circuits.

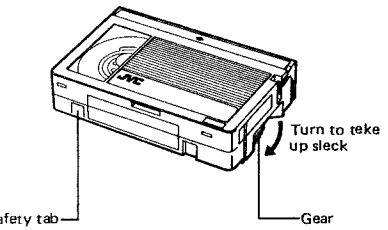
If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to Identify and Resolve Radio-TV Interference Problems".

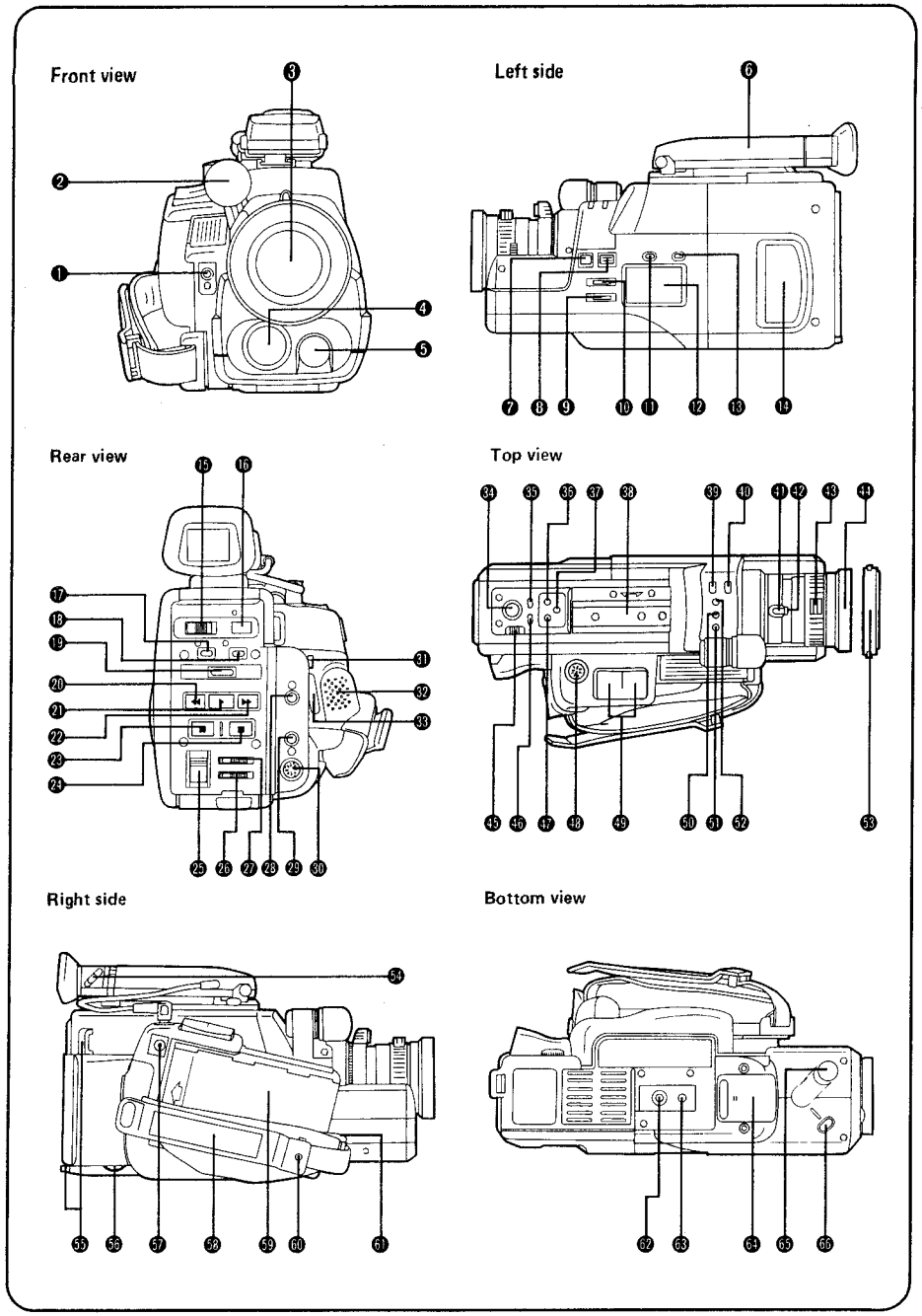
This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.

VIDEO CASSETTES

- The GR-60U employs only the cassettes carrying the VHS marks.
- Recording onto prerecorded tapes automatically erases the previously recorded video and audio signals.
- An inverted cassette cannot be inserted.
- Do not load and unload the cassette repeatedly without allowing the tape to run at all. This will slacken the tape and thereby damage it.
- Make certain before loading the cassette that the tape is not slack. If there is any slack, turn the gear on the cassette in the direction of the arrow to take up slack.
- The cassette is equipped with a safety tab to prevent accidental erasure. When the tab is removed, recording is impossible. If you wish to record on a cassette whose tab has been removed, use adhesive tape to reseal the slot.
- To avoid excessive exposure to dust and fingerprints, do not open the front tape cover.



Storage of cassettes
- Avoid exposing the cassettes to direct sunlight. Keep them away from heaters.
- Avoid storing the cassettes in humid or dusty places.
- Do not drop the cassettes. Do not expose them to violent vibrations or shocks.
- Do not expose the cassettes to strong magnetic fields (near a motor, transformer or magnet).
- Place the cassettes in cassette cases and position them vertically.



CONTROLS AND CONNECTORS

Rafar to the diagrams on the front foldout page.

❶ External microphone jack (MIC)

❶ Exclusive microphone
Omnidirectional condenser microphone for simultaneous sound recording.

❶ 8: 1 zoom lens
F/1.4, f = 8.5 – 68 mm, Filter diameter: 52 mm.

❶ Auto-focus sensor window
Allows light to enter for measuring the camera-to subject distance.

❺ White balance sensor window
Allows light to enter for white balance adjustment.

❺ Electronic viewfinder
For monitoring scenes being shot or the playback picture after recording. Several indicators are included, as well as the date/time or elapsed recording time if selected.

❶ FULL AUTO button
Pressing this button puts the focus and white balance under automatic control and selects the standard shutter speed. Auto-focus can be cancelled by pressing the FOCUS button; auto white balance can be cancelled by pressing the W.BALANCE button; the high-speed shutter can be selected by pressing the SHUTTER button. Pressing the FULL AUTO button in the full-auto mode has no effect.

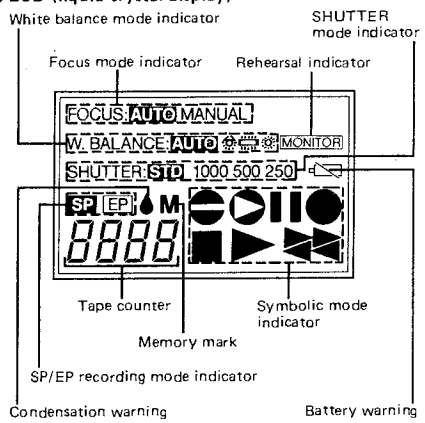
❺ FOCUS select button
Switch to AUTO for automatic focus, and switch to MANUAL to focus manually. Check on the LCD. The focus mode is reversed each time this button is pressed. The auto-focus mode can also be selected (together with the auto-white mode) by pressing the FULL AUTO button.

❺ SHUTTER select button
Pressing this button switches the shutter between 1/1000 ("1000"), 1/500 ("500"), 1/250 ("250")-second high-speed shutter and 1/60-second ("STD") speeds, as displayed on the LCD. The standard shutter speed can also be selected by pressing the FULL AUTO button.

⓲ W. BALANCE select button
The white balance is manually selectable using this button. Press once to display the current white balance mode in the LCD. Continue pressing to cycle through the available modes.
☼ : Halogen or tungsten lighting.
▤ : Fluorescent lighting.
☼ : Daylight.
AUTO: Automatic white balance adjustment.

⓬ Counter MEMORY button
Press this button after resetting the counter to "0" at a point on the tape you want to locate later, and the tape will stop automatically at the counter reading of around "0" during rewind or fast forward.

⓬ LCD (liquid crystal display)



Tape counter:	Shows from "0" to "9999".
Battery warning:	Blinks when the battery power becomes insufficient for normal operation.
Condensation warning:	Appears when excessive condensation occurs inside the unit.
Memory mark:	Appears when the MEMORY button is pressed.

Symbolic mode indicator

STOP:	■	REWIND:	◄◄
PLAY:	►	FAST FORWARD:	►►
PAUSE: (STILL)	II	REVERSE SHUTTLE SEARCH:	► ◄◄
RECORD:	●	FORWARD SHUTTLE SEARCH:	► ►►
RECORD PAUSE:	II ●	RETAKE REWIND:	Blinking ► ◄◄
QUICK REVIEW	Blinking II ●		

RETAKE FORWARD:	Blinking ► ►►
MASTER EDIT CONTROL:	Blinking ►
TAPE END WARNING:	Blinking ●
INSERT:	○
AUDIO DUB:	⊖

⓭ Counter RESET button
Press to reset the counter to "0".

⓭ Cassette holder
Insert a VHS C video cassette for recording or playback.

⓬ POWER switch
Slide to turn the power on. The Stop indication appears on the LCD. Slide again to switch off power.

⑯ **REC standby button**
Press to engage the Recording standby mode. To start recording, press either of the recording start/stop buttons ㊽ , ㉑ .

⑰ **INSERT/MONITOR button**
Push this button when you wish to rehearse shots before actually recording them. This function allows you to view the scene on the viewfinder without recording it. Push the STOP button to release it. To enter the Insert Edit mode, press this button while in the Recording Standby mode.

⑱ **AUDIO DUB button**
Press this button together with the PLAY button for audio dubbing.

⑲ **QUICK REVIEW/EDIT button**
If you want to review the end of the recorded segment for confirmation, press this button from the Record-Pause mode; the tape will be rewound for about two seconds of programme time and played back automatically for this section, after which it will stop in the Record-Pause mode in standby for the next shot. When dubbing from the GR-60U to a designated JVC VCR, it also functions to begin VideoMovie playback in synchronization with video deck recording (see "Master Edit Control system", page 24).

⑳ **REW/SHUTTLE SEARCH/RETAKE button**
Pressing this button in the Stop mode rewinds the tape; pressing it in the Play mode allows fast playback in reverse. (Three times normal speed in SP mode, seven times normal speed in EP mode.)

㉑ **PLAY button**
Press to start playback. When this button is pressed when the unit is in the REC PAUSE mode, the unit will enter the REC mode.

㉒ **FF/SHUTTLE SEARCH/RETAKE button**
Pressing this button in the Stop mode fast-forwards the tape; pressing it in the Play mode allows fast playback. (Three times normal speed in SP mode, seven times normal speed in EP mode.)

㉓ **PAUSE/STILL button**
Press to view a still picture during playback or pause playback. When this button is pressed in the REC mode, the unit will enter the REC PAUSE mode.

㉔ **STOP button**
Press to engage the Stop mode.

㉕ **EJECT switch**
To open the cassette holder.

㉖ **DUBBING ON/OFF switch**
Normally, set to OFF. For best picture quality when dubbing, set it to the ON position.

㉗ **SP/EP recording mode select switch**
Set to SP to record at standard tape speed. Set to EP to record at a slower tape speed, allowing an extended recording time of up to one hour with TC-20.

㉘ **REMOTE control jack**
For connection of the optional RM-V15U remote control unit.

㉙ **Earphone jack (PHONE)**

㉚ **AV OUT connector**
Both audio and video signals can be delivered from this connector. For playback with a TV set not equipped with A/V terminals, connect the RF-V3U RF unit (provided) to this connector and to the TV. To dub from this unit, connect the A/V input connectors of a second recorder to this connector, using the provided VC-VB26U A/V output cable. To play back from this unit to a TV set, make a connection between this connector and the TV's A/V input terminals using the A/V output cable.

㉛ **ALARM ON/OFF switch**
Switch to ON to engage the trigger alarm system. Switch to OFF when you do not wish to use this system.

㉜ **Thumb rest**
Place your thumb on this grooved area next to the start/stop switch between switch operations.

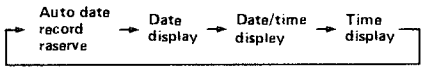
㉝ **Recording start/stop button (Trigger button)**
Press this button in the Recording Standby mode to start recording. Pressing it again re-engages the Recording Standby mode.

㉞ **Second recording start/stop (SUB TRIGGER) button**
Functions exactly as the other recording start/stop button, for use when recording with the GR-60U held low.

㉟ **DATE/TIME ON/OFF button**
Press this button when you do not wish to record the date/time. This will remove date/time indications from the viewfinder. Press again to record date/time. Date/time will reappear in the viewfinder.

㊱ **DATE/TIME SELECT button**
Use to select the portion of the clock or date settings to be changed. Cycles through the year, month, day, hour, and minute settings. To end adjustment, press once after selecting the minute portion.

㊲ **DATE/TIME MODE button**
Press this button to select the date/time display and Recording mode. It cycles through the modes in the following order:



The auto-date-record function automatically displays and records the date for 5 seconds upon turning on the power and beginning recording. Before recording begins, this mode is indicated in the viewfinder by auto date record reserve indication "-.-.-".

㊳ **Viewfinder mount**
Attach the provided viewfinder.

㊴ **TITLE PAGE button**
Press this button to select which page of memory you wish to store your title in. This button only functions when the title is displayed in the viewfinder.

㊵ **TITLE ON/DFF button**
Press to mix memorised title or illustration with action being recorded. Press again to end mixing process.

㊶ **Manual zoom lever**
Use to turn the zoom ring manually.

㊷ **Macro button**
Turn the zoom ring while pressing this button for macro shooting.

㊸ **Manual focus ring**
Use to turn the focus ring manually.

㊹ **Lens hood**

㊺ **REC TIME DN/OFF switch**
When this switch is set to ON, the viewfinder displays the elapsed recording time. Switch to OFF to cancel the display.

㊻ **REC TIME RESET button**
Press this button to reset the elapsed recording time to zero. Ejecting the cassette also does this.

㊼ **DATE/TIME SET button**
Use to set the built-in clock and date function.

㊽ **Viewfinder cable connector (EVF)**
Connect the viewfinder cable.

㊾ **Power zoom buttons**
For automatic zooming at slow speed, press lightly. For regular speed zooming, press firmly. "T" is for telephoto zooming and "W" is for wide-angle zooming.

㊿ **IMAGE REVERSE button**
Press this button to activate the title reverse effect. The function will switch from positive to negative mode with successive pressing of this button.

(51) **TITLE MEMORY button**
Up to four "pages" of titles can be stored. The digital memory is maintained by the lithium battery which powers the unit's clock. Each time the TITLE MEMORY button is pressed, a previously stored title will be erased, and a new one will be stored in its place in the designated page of memory.

(52) **COLOR button**
Press this button to select the colour for a title or illustration. The color choices cycle as follows: black, white, yellow, cyan blue, green, magenta, red, blue. Press this button repeatedly until the desired color appears.

(53) **Lens cap**
Cap the lens when not in use.

(54) **Dioptric adjustment control**
Adjusts the viewfinder lens to suit the operator's eyesight.

(55) **Slots for shoulder strap**

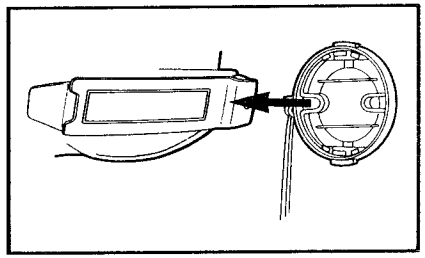
(56) **TRACKING control**
Minimises noise bars, if observed, during playback.

(57) **DC IN terminal**
For connection of the provided AA-V6U AC power adapter/battery charger, optional BH-V5U car battery charger or AP-P1U car battery cord for DC power supply.

(58) **Grip strap**
Secures the operator's hand to the hand grip. Adjusts to fit hand size.

(59) **Battery mount**
The battery pack serves as a contoured handgrip when attached to the battery mount.

(60) **Lens cap hook**
This keeps the lens cap from swinging during shooting.



(61) **Battery pack release lever**

(62) **Tripod mounting socket**

(63) **Stud hole**

(64) **CLDCK battery compartment**
Holds the lithium battery that powers the date, time and title memory function.

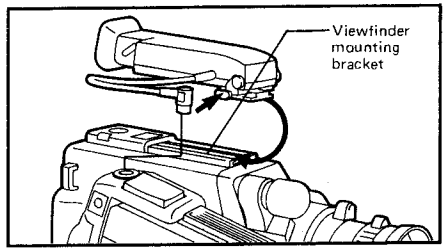
(65) **BLC button**
Iris control is always automatic. For backlight compensation, press this button. While it is being pressed, the iris is 1 – 2 f-stops wider than the automatic setting.

(66) **FADER button**
To fade out the picture to a white blank screen, press this button, then press the recording start/stop button to start fading out. To fade in from a white blank screen, press this button, then press the recording start/stop button to start fading in.

BASIC PREPARATIONS

Switch off power before mounting or removing viewfinder.

Mounting the viewfinder

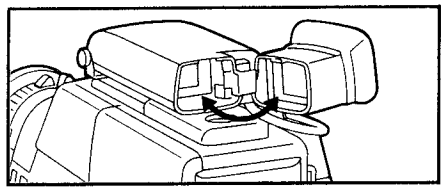


1 Align the viewfinder's coupling fixture with the mounting bracket on the body and slide the fixture into the bracket while pressing the knob.

2 Connect the viewfinder cable to the viewfinder cable connector (EVF).

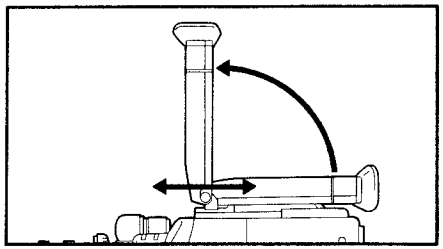
To remove the viewfinder:
Pull out the viewfinder cable and slide the viewfinder out of the bracket while pressing the knob.

Opening the eyepiece



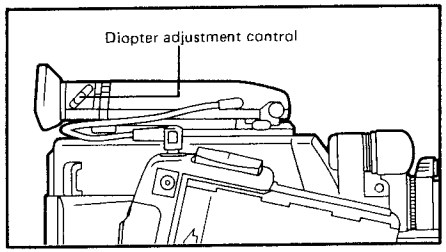
The veiwfinder eyepiece can be opened for cleaning or better viewability in playback.

Positioning the viewfinder



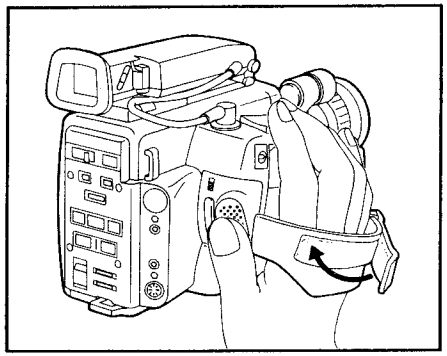
The viewfinder can be positioned for best viewability. It can slide forward or back and can be tilted up 90°.

Diopter adjustment



The viewfinder lens can be adjusted to suit the operator's eyesight by sliding the diopter adjustment control.

Adjusting the grip strap



1 Separate the Velcro strip to expand the loop.

2 Pass your right hand through the loop and grasp the lens grip. Adjust the length of the strap to suit your hand size and refasten the Velcro strip.

POWER SUPPLY SYSTEM

The convenient 3-way power supply system gives you a choice of the most appropriate power supply unit, depending on the application.

CAUTION
- No function is available without power supply.
- Do not use any power supply other than specified.
- Never attempt to use these power supply units with any equipment other than the VideoMovie.

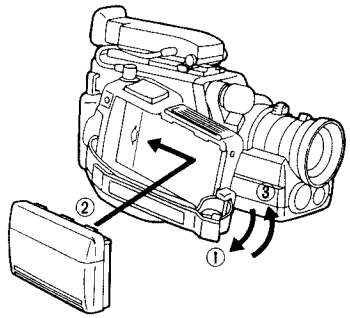
When AC power is not availahle

Use the battery packs:
- BN-V5GU (Regular)
- BN-V6GU (High-capacity)
- BN-V7GU (Super High-capacity)

Note:
The battery pack has been kept in the uncharged state for shipment. Therefore, before use, be sure to charge it. See page 27.

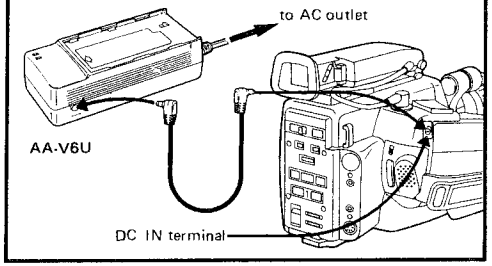
Attaching the Battery Pack
① Pull down the battery pack release lever.
② Align the battery pack over the outline in the battery pack mount, and slide the battery pack into place in the direction of the arrow.
③ Push up on the battery pack release lever, until it locks into place.

To remove the battery pack, pull down the battery pack release lever and slide out the battery.



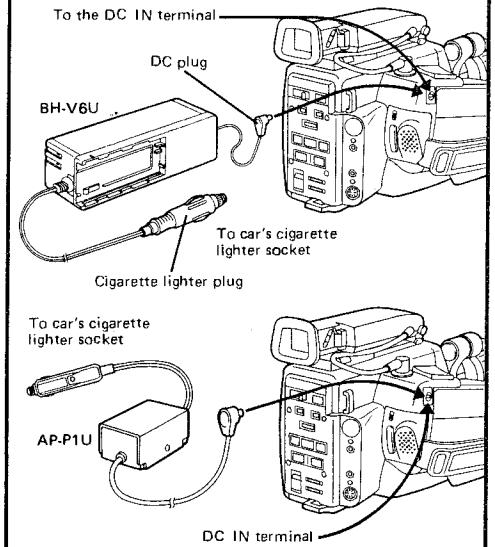
With AC power

Use the provided AA-V6U AC power adapter/battery charger.
Note:
This unit can be used with 110 V to 240 V power supplies. Selection is automatic and no adjustment is required.



In a car

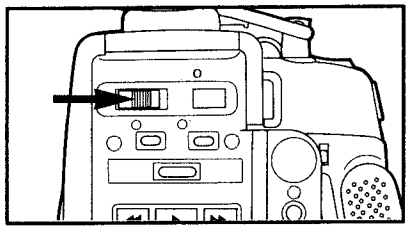
Use the optional AP-P1U car battery cord or BH-V5U car battery charger.
- Leave the car's engine idling when using the car battery. (For use with 12-V negative-grounded cars only.)



LOADING AND UNLOADING A VIDEO CASSETTE

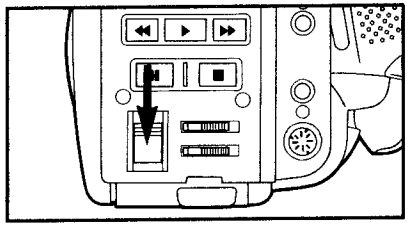
LOADING

1



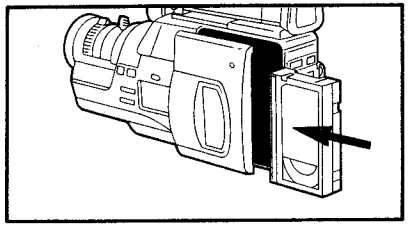
Slide the POWER switch to turn power on.

2



Open the cassette holder by pressing the EJECT button.

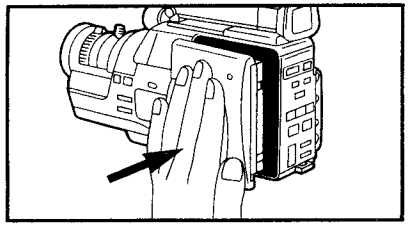
3



Insert the cassette with its printed arrow facing outward.

Ensure that tape is not slack inside the cassette, then load the cassette correctly. See page 4.

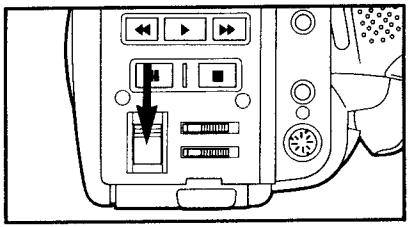
4



Close the cassette holder by pushing its center area.

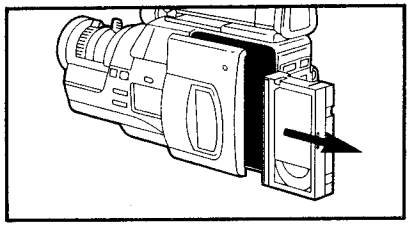
UNLOADING

1



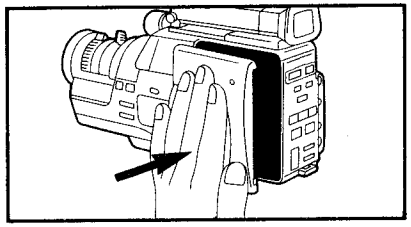
Make sure the unit is in the Stop mode. Press the EJECT button. The cassette holder will open.

2



Remove the cassette.

3



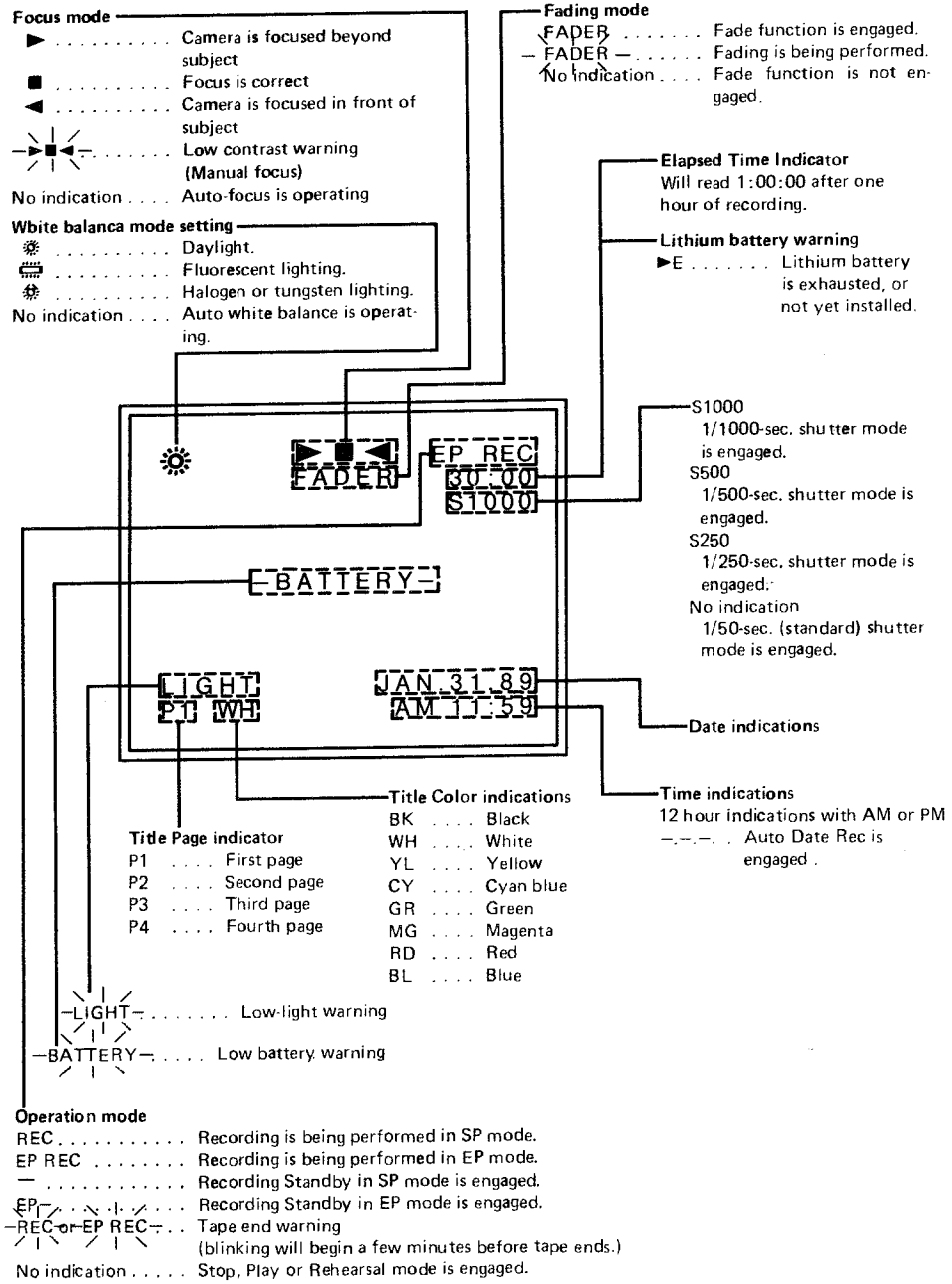
Close the cassette holder by pushing its center area.

- When not in use, switch off power.

Note:

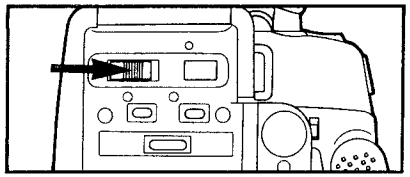
- Do not repeat loading and unloading of the cassette without running the tape, as this will slacken the tape, causing tape damage.

VIEWFINDER INDICATIONS



RECORDING OPERATIONS

1

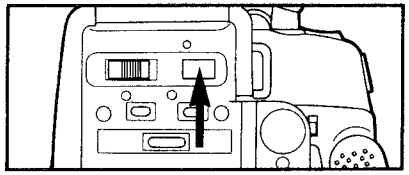


Slide the POWER switch to ON.

2 Insert a video cassette correctly (with its safety tab in place).

3 Set the SP/EP recording mode select switch as required.

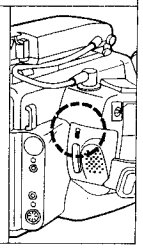
4



Press the REC Standby button. The unit enters the Recording Standby mode.

Trigger alarm system

When the ALARM ON/OFF switch is set to ON, an electronic alarm beeps when the Recording start/stop button is pressed to begin recording.
The electronic alarm beeps twice when the Recording start/stop button is pressed for record pause. This alarm helps prevent recording errors.



Elapsed time display

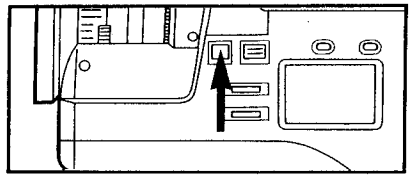
The accumulated recording time (elapsed time) can be displayed on the viewfinder.

1. Set the REC TIME ON/OFF switch to ON. The recording time is displayed on the viewfinder screen.
2. If you wish to reset it to "00:00", press the REC TIME RESET button.

Notes:

- When you wish to disengage the Elapsed Time Display mode, set the REC TIME ON/OFF switch to OFF.
- 1:00:00 indicates 1 hour has elapsed.
- Unloading the cassette also resets the display to "00:00".
- This convenience functions only when camera shooting is performed.

5



For full-auto operation, press the FULL AUTO button.

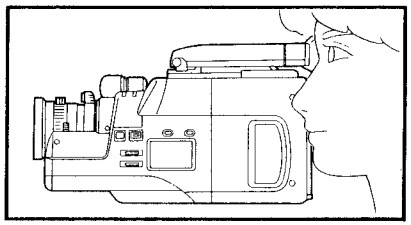
For manual override, use the W. BALANCE and FOCUS buttons.

- Press the W. BALANCE button so that the required symbol appears on the viewfinder and on the LCD.
  - : when the subject is illuminated by a halogen or tungsten lamp.
  - : when the subject is illuminated by a fluorescent lamp.
  - : when you shoot in the daytime outdoors.
- When shooting under fluorescent light, always use the fluorescent light setting in the manual white balance mode for best results.
- For manual focus, press the FOCUS button so that MANUAL is shown on the LCD. A focus-aid indicator will appear in the viewfinder. (See page 14.)
- Iris control is always automatic. Therefore, possible combinations of auto and manual functions are as follows:

Control / Function	FULL AUTO	W. BALANCE	FOCUS	FOCUS W. BALANCE
White balance	Auto	Manual	Auto	Manual
Focus	Auto	Auto	Manual	Manual
Iris	Auto	Auto	Auto	Auto

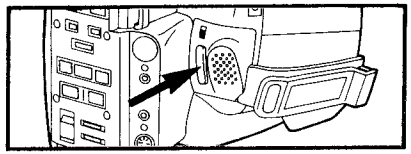
- Be careful not to cover the white balance sensor window, otherwise correct white balance will not be obtained in the auto focus mode.
- For high-speed electronic shutter, see page 15.

6



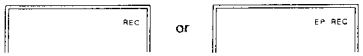
Determine the focus and composition by referring to the viewfinder image. For zooming, see page 18.
For date/time recording, see page 17.

7



Press the start/stop button.

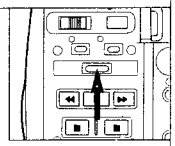
- This causes REC or EP REC to appear on the viewfinder screen, showing that recording is actually taking place.



- The LCD display shows:

8 To stop recording temporarily, press the start/stop button once again.

Quick Review function



- If you want to review the end of the last recording for confirmation, press the QUICK REVIEW/EDIT button from the Recording Standby mode; the tape will be rewound of about 2 seconds for program time and played back automatically for this section, after which it will stop in the Recording Standby mode for the next shot.

Notes:

- The TRACKING control should be at its center position.
- Distortion might occur when playback starts. This is normal.

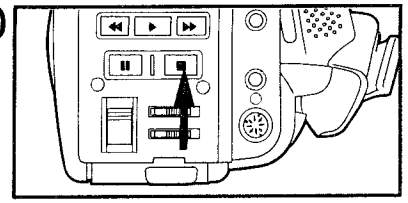
9 To restart recording, press the start/stop button.

- For a pause longer than 3 minutes, press the POWER switch to OFF.
- If the Recording Standby mode continues for longer than about 5 minutes, the unit switches itself off automatically. To restart recording, turn the power on. This makes clean assembled recordings possible even after a long pause.

Assemble recordings

- Repeating steps 7 and 8 produces assemble recordings.
- If recording is restarted from the Stop mode, a few frames of the previously recorded picture are replaced with a new recording. To avoid this, follow the technique described in "Assemble Recording Technique-2" on page 16.

10

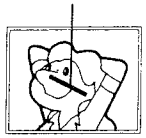


To end recording, press the STOP button.

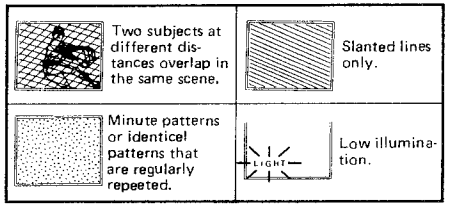
- After making sure that the tape has stopped, press the POWER switch to OFF.

Precautions for auto-focus

Focus detection zone



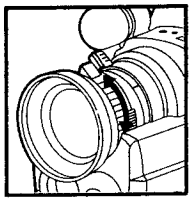
- A small area around the center of the picture, which varies depending on the zoom and focus conditions, is used to detect focus. (No actual indication provided on the screen.)
- Do not touch the focus ring while the auto-focus mechanism is in operation.
- Be careful not to cover the auto-focus sensor window, otherwise accurate focusing will not be possible.
- When not in use, do not leave the GR-60U in the Auto-focus mode with power on; otherwise light entering the auto-focus sensor window will operate the auto-focus mechanism, consuming power.
- If the lens and/or auto-focus sensor window are smeared with stains or blurred with condensation, accurate focusing is not possible. Keep them clean. If they become dirty, wipe with a piece of soft cloth. When condensation occurs, dry them by wiping with a soft cloth or wait for conditions in which they become dry.
- Correct focus may not be obtained in the following situations. In such cases manual focusing should be performed to obtain proper focus.



Caution:
Be careful not to touch any buttons inadvertently during shooting.

Manual focus

If the manual focus mode is selected, proceed as follows:



1. Zoom in on a subject by pressing the "T" button.
2. Focus onto it by turning the focus ring. Refer to the focus aid indication chart below.
3. Determine the composition by pressing the "W" button.

Notes:

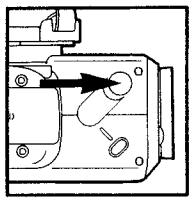
- When you use the Manual Focus mode, be sure to focus the lens in the maximum telephoto position. If you focus in on a certain subject in the wide-angle position, sharply-focused images cannot be obtained when zoomed up because the depth of field is reduced at longer focal lengths.
- Covering the white balance sensor while manually focusing will result in poor color reproduction.

Focus indicators

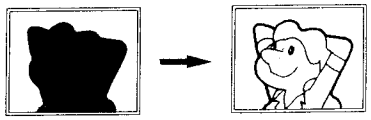
Condition	Indication	Corrective operation
Focus point behind the subject		Turn the focus ring clockwise until the center square lights.
Correct focus		Keep the focus ring in the same position.
Focus point in front of the subject		Turn the focus ring counterclockwise until the center square lights.
Indication not possible because of low contrast		Estimate the subject distance and set the focus ring referring to the distance scala on it.

Backlight compensation

- Press the BLC button. While it is being pressed, the iris is 1 – 2 f-stops wider than that adjusted automatically.

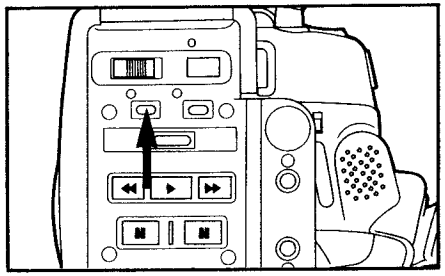


- When excessive lighting is located in back of the subject, correct exposure may not be obtainable. To compensate for this, use BLC.



Without BLC — With BLC

Rehearsal

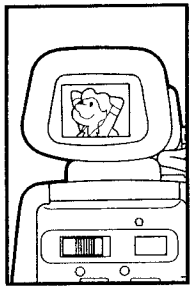


If you wish to rehearse shooting angles, compose scenes, etc., without actually recording on the tape, press the INSERT/MONITOR button, instead of REC. The aimed-at scene will appear on the viewfinder screen. For full-auto rehearsal, also press the FULL AUTO button. To engage the Recording Standby mode from rehearsal, press the REC button. To disengage the Rehearsal mode, press the STOP button:

- Rehearsal is possible whether a cassette is loaded or not.
- With a cassette loaded, rehearsal is not possible during rewind or fast forward.
- The power save circuit does not function during rehearsal. (For power save function, see page 16.)

Viewfinder Monitoring

- Rewind the tape to a point from which you want to check the recording.
- Press the PLAY button, and you can view the playback picture on the viewfinder screen.
- Pressing the PAUSE/STILL button during playback stops the picture on the viewfinder screen.
- Shuttle search is also possible in both directions.



Multiple-speed electronic shutter

The GR-60U is equipped with a selectable high-speed shutter that allows better recording of quick movements for sharp, clear stills or slowmotion playback. Select it when taping fast-action shots that you will want to play back later in Still or Slow-motion mode.

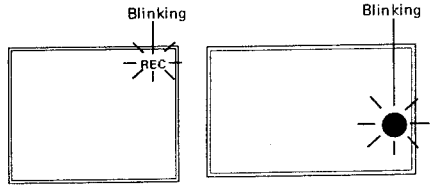
1. Select the shutter speed among 1/1000, 1/500, 1/250 and Standard (1/60)-second by pressing the SHUTTER button. This can be done while recording or in any other mode. It continues at the selected speed until switched to another speed. When selected, the High-Speed Shutter mode is indicated on the viewfinder screen and LCD.
2. When finished recording the fast-action scene, switch back to the standard shutter speed by pressing the SHUTTER button until STD appears on the LCD.

Notes:

- The High-Speed Shutter mode requires slightly more subject illumination than the Standard Shutter mode. Therefore, the low-light warning may blink in the viewfinder. If so, switch to the Standard Shutter mode.
- Picture color may be adversely affected in the High Speed Shutter mode when the subject is lit by alternating discharge-type light sources such as fluorescent or mercury-vapour lights.
- When playing back a section recorded in the High-Speed Shutter mode, movement of subjects in the picture may not be smooth. This is not due to any defect of the unit.
- Pressing the FULL AUTO button also restores the shutter speed to the standard level.

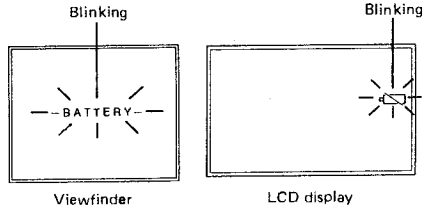
Warnings

Tape-end warning



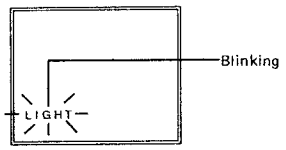
- The recording indicator blinks on the viewfinder screen and the LCD a few minutes before the end of the tape.
- When the end of the tape is reached during recording, the Stop mode engages automatically.

Battery warning



- When the battery power is coming to an end, a battery warning indication appears in both the viewfinder and the LCD. Replace the battery pack with a fully charged one.
- After these indications appear, the power turns off automatically. In this state, however, pressing the POWER switch while holding EJECT button pressed turns the power on and ejects the cassette.

Low-light warning



- If the blinking "LIGHT" indicator appears on the viewfinder screen, the amount of light is insufficient. Increase the lighting.

POWER SAVE AND TAPE PROTECTION CIRCUIT

- To save bettery power, the GR-60U (when battery-operated) switches itself off automatically in the following situations:
  (1) When left for longer than 5 minutes in the Stop mode.
  (2) When left for longer than 5 minutes in the Recording Standby (Record-Pause) mode.
- To protect the tape, the GR-60U (regardless of whether battery-operated or AC-powered) releases tape tension slightly and switches itself off automatically if left for longer than 5 minutes in the Recording Standby (Record-Pause) mode.
- For the same reason, the GR-60U enters the Stop mode and switches itself off automatically if left for longer than 5 minutes in the Still (Play-Pause) mode.

Battery nperation

STOP → POWER OFF
5 minutes

Battery/AC operation

RECORD PAUSE → POWER OFF
5 minutes

PLAY PAUSE (STILL) → STOP → POWER OFF
5 minutes

ASSEMBLE RECORDING TECHNIOUE — 1 (To replace the battery pack during recording)

1 If the battery warning appears in the viewfinder or the LCD while recording, stop recording by setting the POWER switch to OFF, not the STOP button.

2 Replace the battery pack with a charged one.

3 Set the POWER switch to ON.
- The unit will be in the Recording Standby mnde.

4 Press the recording start/stop button to start recording.

ASSEMBLE RECORDING TECHNIOUE — 2 (To search for the assemble point with the "Retake" function)

After reviewing a recorded segment, you may decide to re-record it immediately. The Retake function is convenient for this.

1 Make sure the camera is in thc Recording Standby mode. (If not, engage the mode.)

2 Press either REW/FF button to reach the point where you wish a new recording to start. When the REW/FF button is released, the camera will enter the Recording Standby mnde again.

3 Press the start/stop button to start recording.

ASSEMBLE RECORDING TECHNIQUE — 3 (To record onto a partially recorded tape)

1 Play back the tape to a point where you wish a new recording to start.
- Use the SHUTTLE SEARCH button for faster location.

2 Press the PAUSE/STILL button at the located point.
- The unit will enter the Still mode.

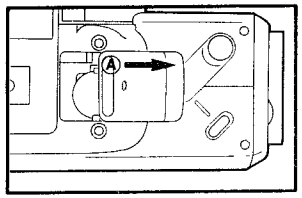
3 Press the REC button.
- The unit will enter the Recording Standby mode.

4 Press the recording start/stop button to start recording.

RECORDING THE DATE/TIME

Warning on lithium battery
- Dispose of used battery promptly.
- Keep away from children.
- Do not disassemble and do not dispose of in fira.

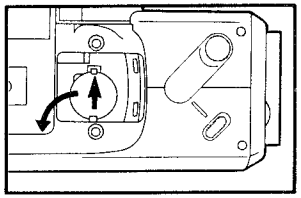
Battery insertion



- Switch off the unit's power before inserting the battery.

This battery powers the date/time function.
1. Slide the cover off the CLOCK battery compartment on the bottom of the VideoMovie by pressing lightly on the section labelled Ⓐ in the diagram.
2. Insert the provided lithium battery **with the plus (+) side up.**
3. Slide the cover back until it clicks.

Battery replacement



- Switch off the unit's power before removing old battery.

The battery lasts for about one year. When the lithium battery warning (▶E) appears in the viewfinder, this battery needs to be replaced. Obtain a new CR 2025 lithium battery and perform the following procedure.
1. Remove the battery by pressing the knob in the direction of the arrow.
2. Insert the new CR 2025 **with the plus (+) side up.**
3. Slide the cover back until it clicks.

Note:
- Replace battery with Panasonic (Matsushita) type CR 2025 only. Use of another battery may present risk of fire and explosion.

Date/time setting

Before adjusting the date and time for the first time or after replacing the batteries, JAN.1.S9 blinks in the viewfinder, indicating the clock needs to be set.

① Switch the unit's power on, JAN.1.S9 will blink in the viewfinder. Press INSERT/MONITOR button to enter rehearsal mode.
② Press the DATE/TIME SELECT button — the year blinks.
③ Press the DATE/TIME SET button to choose the correct number.
④ Press the DATE/TIME SELECT button to select the next item to change, with the item selected changing in the following sequence:

Year → Month → Day → Hour → Minute → Finish Adjustment

⑤ Repeat steps ② and ③ to set all items. After the minute setting has been performed, press the DATE/TIME SELECT button, and items will cease blinking, and the clock will resume normal function. For the auto date record mode, the auto date record reserve indicator will appear.

Date/time recording

The date, time, or date and time can be displayed and recorded according to the selected mode. Press the DATE/TIME MODE button to cycle through the modes in the following order:

→ Auto date record → Date display → Date/time display → Time display → (Auto date record reserve)

Date/time recording indications
- When the auto-date-record function is selected, "-.-.-" appears in the viewfinder until recording begins. As long as this function is chosen, the date will be automatically displayed and recorded for about 5 seconds following the first operation of the recording start/stop button after the power is turned on.
- Auto date record reserve indication will cease to be displayed, if the DATE/TIME ON/OFF button is set to OFF unless power is reapplied.

Auto date record		Data display	Date/time display	Time display
—.—.—	JAN.31.89	JAN.31.89	JAN.31.89 AM 11:59	AM 11:59
Auto date record reserve	Auto date record executed			

SPECIAL TECHNIQUES

Fade-in/out

The GR-60U is equipped with an automatic fade mechanism for allowing smooth fade-in and fade-out with a white-colored screen. Audio also fades in sync with video.

Automatic fade-in

1 Determine the composition in the Recording Standby mode and press the FADER button to reserve the fade-in mode.

2 Press the start/stop button. The screen will quickly become white and recording begins. When the start/stop button is released, fade-in will start. It will be completed in about 5 seconds. If the start/stop button is not released when pressed, the white picture will remain on the screen and be recorded.

Automatic fade-out

1 Start shooting as usual.

2 Press the FADER button to reserve the fade-out mode.

3 Press the start/stop button. Fade-out will start and be completed in about 5 seconds. When completed, Recording Standby mode is entered. If the start/stop button is not released when pressed, the final white picture remains on the screen and continues to be recorded, until the button is released.

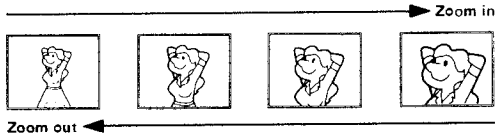
- FADER is displayed in the viewfinder when fading is reserved, and continues to be displayed until fading in or out is completed.

Zooming

When the focal length of the lens is varied by turning the zoom ring, the image appears to come nearer to or retreat from the viewer.

Power zooming

Press "T" for zooming in and "W" for zooming out. Two zooming speeds are available. For slow-speed zooming, press lightly. For regular-speed zooming, press firmly.



Manaul zooming

Rotate the zoom lever downwards for zooming in and upwards for zooming out.

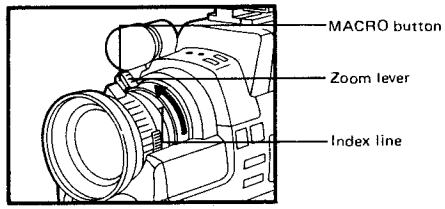
Macro shot

Normally, focusing is possible only for subjects that are more than 1.1 m away from the camera. By setting the lens to the Macro mode, it is possible to manually focus in on any subject located inside that limit, right up to the front of the lens. The MACRO and ZOOM ranges combined give continuous shooting ability from close-up to infinity.

1 First engage the Manual Focus mode. While pressing in the macro button, turn the zoom lever in the direction of the arrow until the number "8.5" on the zoom ring passes the index line.

2 Focus by turning the zoom lever slowly.

3 To release the Macro mode, turn the zoom lever back, in the opposite direction from step 1 above, until the number "8.5" passes the index line.



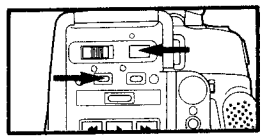
- Use the zoom lever to focus in the MACRO range.
- Turning the zoom ring will slightly alter the angle of view of the lens.
- It is advisable to increase illumination when shooting in macro for best results.
- The auto-focus mechanism does not function during macro shooting.

DIGITAL SUPERIMPOSE

The GR-60U's Digital Superimpose function allows 4 titles to be superimposed on a recording in a choice of 8 colors and either positive or negative (reversed) styles for more creative video opportunity.

Storing Titles

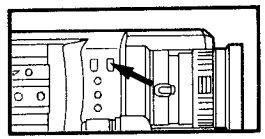
1



Put the unit into the REC PAUSE or REHEARSAL mode.

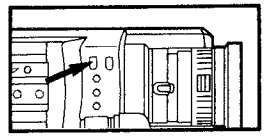
- When the "E" indication (lithium battery warning) appaars in the viewfinder, titles cannot be stored. Insert the lithium battery, or replace the inserted one with a new one according to the instructions on page 17.

2



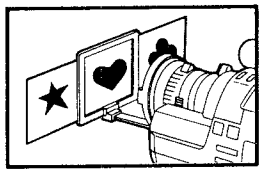
Press the TITLE ON/OFF button.

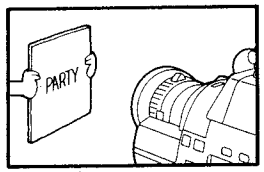
3



Use the TITLE PAGE button to select the page of memory in which you want your title to be stored. The page number will appear on the viewfinder screen.

4

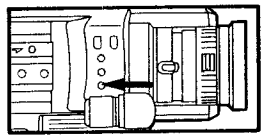




Aim the unit at your title in as well-lit a location as possible. You may also use the provided Title Easel for this purpose.

- If, at this point, the vertical stripes or an old title appearing in the viewfinder prove bothersome, press the TITLE ON/OFF button to turn it off.
- When storing a title, the scene visible in the viewfinder may differ slightly from that which will be recorded on the tape.

5



Press the TITLE MEMORY button for about 1 second to store the title.

- When a title is stored poorly, check to see that the lighting is adequate and that the title is drawn with bold strokes, then shoot the title again.
- Every time the TITLE MEMORY button is pressed, the previously recorded title stored in that page of memory will be erased, and replaced with the new title.

- The page selection can be changed when the TITLE ON/OFF button is ON.
- When a page of memory contains nothing, it is "empty", and a pattern of vertical stripes will appear in the viewfinder.
- When the power is turned off or the unit is put into the Stop mode, the PAGE mode returns to the page 1 position.

Creating Titles

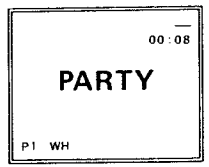
Make note of the following guidelines to assure best results.

1. Create titles using dark colors on light backgrounds – black writing on white paper, for example.
2. Letters should be drawn with broad strokes.

6 Press the COLOR button to selest the color in which you want your title to appear.

The colors will cycle in the following order:

BK (Black) → WH (White) → YL (Yellow) → CY (Cyan blue) → GR (Green) → MG (Magenta) → RD (Red) → BL (Blue) → BK



7 Press the IMAGE REVERSE button to choose negative or positive style.

To store additional titles, in digital memory pages 2-4, repeat steps 3-7 above.

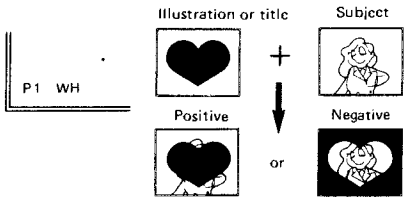
- The TITLE MEMORY button works in both the Rec Pause and Rehearsal modes; care should be exercised not to press TITLE MEMORY accidently as this will erase stored titles.

Making a title at tbe baginning of a recording

1 Put the unit into the REC PAUSE mode.

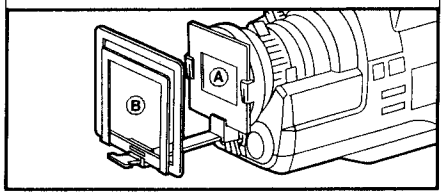
2 Press the TITLE ON/OFF button to display your title on the viewfinder screen.

3 Press the TITLE PAGE button until the title you wish to use is displayed. The pages will cycle from 1 to 4. Confirm the page, the color, and the neg/pos style. Color choice and neg/pos style can be changed at this point. Press the COLOR button to select a different color, and the IMAGE REVERSE button to choose neg/pos style.



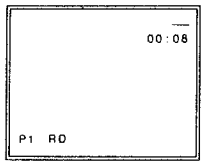
4 Press the unit's trigger to begin recording. The title will now be mixed with what you are recording.
Press the TITLE ON/OFF button when you wish to end the titled portion of your recording.

A photographic slide can be recorded by inserting it in Ⓐ and inserting a blank white card in Ⓑ of the provided title easel. Slides up to 1/8" thick can be used. Illuminate Ⓑ from behind for best results.



Inserting a title in the middle of a recording

1 Confirm the page, color, and neg/pos style of your title.
Press the TITLE ON/OFF button to turn it off.



2 Shoot your live scene by pressing the VideoMovie's start/stop trigger.
Press the TITLE ON/OFF button when you wish to insert your title. It will be inserted into your ongoing recording at exactly that point.

3 Press the TITLE ON/OFF button again to stop inserting your title with the action you are recording.

Notes:
- Color choice, page number, and IMAGE REVERSE selections can be changed when the title is displayed in the viewfinder.
- The "Color" and "Page number" indications displayed in the viewfinder will not be recorded on the tape.
- When an "empty" page is called from memory, a pattern of vertical stripes will appear in the viewfinder.
- When the lithium battery for the unit's clock is exhausted, stored titles may be lost. For best results, replace the lithium battery before its one year required replacement date. When the lithium battery warning appears in the viewfinder, as long as power is still supplied to the unit by the main battery pack, or from an AC source (even if the unit's power switch is off), the digital memory will be retained, however, the lithium battery should be replaced at this time.

PLAYBACK

The GR-60U permits playback of recorded VHS video cassettes.
For connections refer to pages 22 and 23.

Preparations
- With a television equipped with audio/video input connectors, set the television's TV/VIDEO switch to VIDEO.
- With a regular television receiver, set the aerial select switch of the RF-V3U RF unit to VIDEO and the TV receiver's channel selector to your video channel (3 or 4).

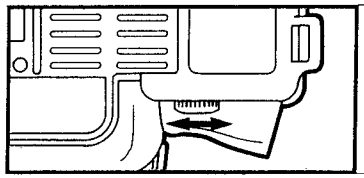
1 Connect a power supply unit. (Battery or AC operation: see page 9.)

2 Press the POWER switch to ON.

3 Insert a pre-recorded cassette and press the PLAY button. Playback will start.

Ensure that tape is not slack inside the cassette, then load the cassette correctly. See page 4.

- The SP/EP switch may be in either position. The SP or EP mode recording is automatically detected and played back at a correct speed respectively.



Tracking adjustment
If noise bars appear on the screen, adjust the TRACKING control. Turn it slowly in either direction to minimise noise bars. After playing a particular tape, return the TRACKING control to the centre position.

Sbuttle Searcb

Fast-speed playback in the forward
Press the FF button in the Play mode. Playback will be speeded up to 3 times normal speed in SP mode, 7 times normal speed in EP mode.

Fast-speed reverse playback
Press the REW button in the play mode. The tape will be played back in the reverse direction at 3 times normal speed in SP mode, 7 times normal speed in EP mode.

Still playback

Press the PAUSE/STILL button during playback. The picture will stop on the screen.
- After about 5 minutes of still playback, the unit enters the Stop mode automatically, for tape protection, and switches itself off.

Notes:
- For brief scanning, keep the Shuttle Search button pressed for more than 2 seconds; when you release the button, the Search mode will be cancelled.
- Noise bars will appear and pictures may become monochrome while in these modes. This is not due to any defect of the unit.

Counter Memory Function

The GR-60U incorporates a counter memory mechanism which facilitates locating a specific tape segment.

1 Press the RESET button to reset the counter to "0".

2 Press the MEMORY button. The "M" mark will appear.

3 After recording or playback, press the STOP button, then the REW button. The tape will automatically stop at the counter reading of around "0".

4 Press the PLAY button to start playback.

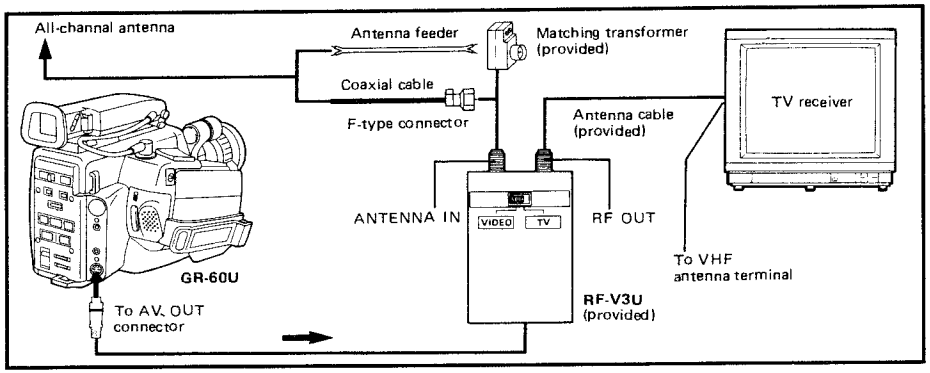
Notes:
- The counter memory function is effective in the Fast Forward mode as well.
- To cancel the memory function, press the MEMORY button.
- When the power supply unit is disconnected, all indications on the LCD disappear and the counter memory function is instantly cancelled.

CONNECTION TO A TELEVISION FOR PLAYBACK

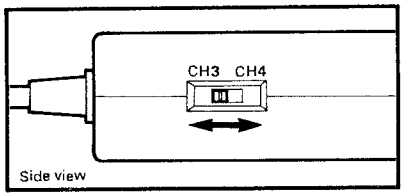
The GR-60U includes playback circuits and allows playback of pre-recorded cassettes simply by connecting to a television set.

Connection to a television not equipped with audio/video input connectors

For this situation, use the RF-V3U RF unit (provided).



1



Set the output channel select switch of the RF-V3U to CH3 or CH4.

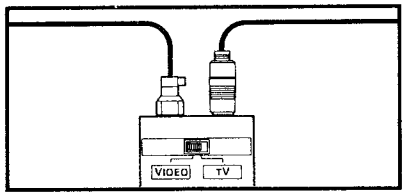
- The RF unit permits playback of video and audio recordings through a TV receiver. The signals from the RF unit are viewed through a vacant channel not used for broadcasting in your area.
- The RF unit has been set to CH3 prior to shipment. Reset the channel to CH4 (using a screwdriver) in areas where channel 3 is employed for broadcasting.
- This is your video channel. To view video cassettes, always set the TV channel selector to either channel 3 or 4.

PRECAUTIONS FOR RF-V3U

- For exclusive use with the VideoMovie.
- Do not disassemble or remodel the RF-V3U.
- Do not expose it to strong shocks.
- Unplug the connected equipment during lightning storms.
  (Never touch the antenna cable.)

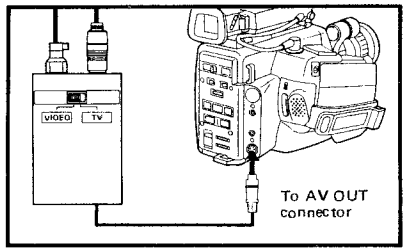
2 Remove the antenna cable from the TV receiver.

3



Connect the antenna cable to the ANTENNA IN terminal of the RF unit.
Connect the RF OUT terminal of the RF unit to the 75-ohm coaxial antenna terminal of the TV receiver using the provided antenna cable.

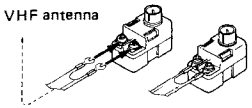
4



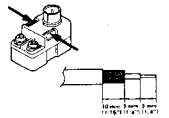
Connect the AUDIO/VIDEO INPUT cable of the RF unit to the AV OUT connector of the GR-60U.

How to affix the matching transformer to your VHF antenna cable

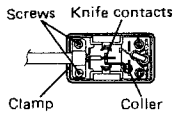
- If you VHF antenna cable is a 300-ohm flat feeder, connect the two lugs to the screws in an ordinary manner.



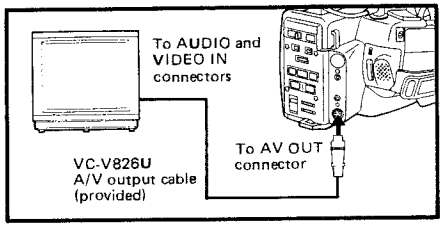
- If your VHF antenna cable is a 75-ohm coaxial cable, proceed as follows:



① Press both side tabs inward and slide the cover off.
② Strip the coaxial cable with a pair of wire strippers, a knife, or the like as shown.
③ Remove the collar and put it on the pole inside the cover.
④ Loosen the screw for the clamp and insert the stripped cable so that the braided portion is positioned under the clamp.
⑤ Insert the stripped end (core conductor) of the cable from above into between the knife contacts.
⑥ Tighten the screws.
⑦ Replace the cover.



Connection to a television equipped with audio/video input connectors

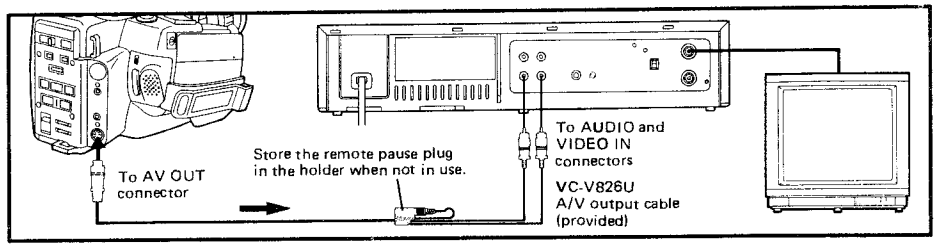


- Simply connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors of the television using the provided VC-V826U A/V output cable.
- The provided VC-V826U A/V output cable can be extended by 5 m (16 ft) with the optional VC-P1U A/V extension cable.
- Use the VIDEO (or A/V) mode specified on the television, instead of tuning to channel 3 or 4.

TAPE DUBBING OR EDITING

Connection

1. Set the DUBBING ON/OFF switch to ON.
2. Connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors of the video recorder using the provided VC-V826U A/V output cable.
3. Connect a television to the video recorder to monitor the picture while dubbing.



Operation

- Put the GR-60U in the Play mode and the connected recorder in the Record mode to copy the recording. To edit out unwanted material, press the recorder's PAUSE/STILL button.

OPERATION

Viewing video cassettes being played back with the GR-60U

To view video cassettes or to monitor the recording, set the VIDEO/TV switch of the RF channel selector to the channel corresponding to the RF output channel (3 or 4).

Viewing television programs

Set the VIDEO/TV switch to TV, and the TV receiver will function as usual.

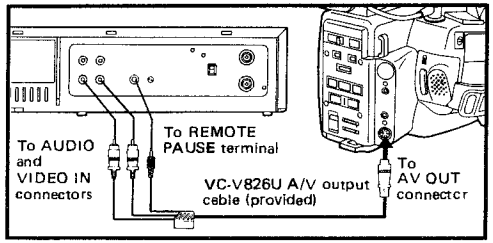
MASTER EDIT CONTROL SYSTEM

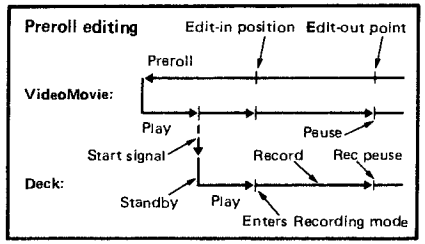
There are some VCRs which are not compatible with Master Edit Control. For these units, use the VCR's pause control to perform edit-in or edit-out functions.

This function is available when using designated JVC video decks equipped with a remote pause terminal. The Master Edit Control system allows control of the connected deck using the VideoMovie's controls, preroll editing for edits free of transition-point gaps and distortion.

Connection

1. Set the DUBBING ON/OFF switch to ON.
2. Connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors and remote pause terminal of the video recorder.
3. Connect a television to the video recorder to monitor the picture while dubbing.





Operation

Dubbing can be initiated from Stop mode or Still mode.

• For dubbing a tape

1. Switch on the VideoMovie's power.
2. Switch on the deck's power.
3. Put the deck in the Record-Pause mode.
4. Press the QUICK REVIEW/EDIT button to start editing. The tape is loaded, then dubbing starts.
5. Tape stops when the PAUSE/STILL or STOP button of the GR-60U is pressed or counter reaches "M, 0".
6. Deck stops recording and enters the Record-Pause mode.

• For editing

1. Switch on the VideoMovie's power.
2. Turn on the deck's power.
3. Put the deck in the Record-Pause mode.
4. Locate the edit-in point via play, fast-forward, rewind, or Shuttle Search, and press the PAUSE/STILL button.
5. Press the QUICK REVIEW/EDIT button to start editing.
6. Tape stops when the PAUSE/STILL or STOP button of the GR-60U is pressed or counter reaches "M, 0".
7. Deck stops recording and enters the Record-Pause mode.

Note:

When the QUICK REVIEW/EDIT button is pressed from the Still mode, the tape is rewound for 5 seconds of program time. The Play indicator blinks on the LCD to indicate rewinding is taking place. After prerolling, first the prerolled section is played back for stabilizing tape run. During playback of the GR-60U, it gives a start signal to the deck standing by in the Record-Pause mode to start playback and then to enter the Recording mode at the edit-in point, while the GR-60U continues playback. The Master Edit Control indicator appears on the LCD during dubbing.

Setting the edit-out point using counter memory

In the above procedures, counter memory can be used to set the edit-out point before editing takes place, so that the VideoMovie automatically stops playback at the designated point. If the edit-out point is to be set in this way, do so following step 3 of the dubbing operation.

1. Locate the desired edit-out point on the VideoMovie's tape.
2. Press the VideoMovie's PAUSE/STILL button.
3. Reset the VideoMovie's counter to "0".
4. Press the VideoMovie's counter MEMORY button.
5. The VideoMovie enters the Pause mode, and the deck enters the Record-Pause mode.

Note:

When the tape reaches the preset edit-out point during the dubbing operation, it may stop slightly before or after the designated point on the tape.

INSERT EDITING

Insert editing means recording a new scene into a section of prerecorded tape so that a part of the original recording can be replaced with a new sequence without excessive picture distortion at the edit-in and edit-out points. In the Insert Edit mode, the original audio on the normal audio track remains unchanged.

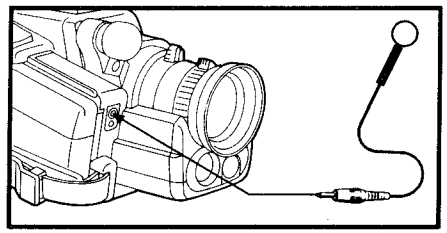
1. Locate the desired edit-out point on the VideoMovie's tape and press PAUSE/STILL.
2. Press RESET to obtain a "0" reading, then press MEMORY to obtain an "M" indication on the LCD.
3. Press REW/SHUTTLE SEARCH to rewind the tape a little beyond the beginning of the scene your wish to insert.
4. Press PAUSE/STILL exactly at the beginning of the scene you wish to insert.
5. While holding INSERT/MONITOR pressed, press PAUSE/STILL. The INSERT indicator lights and the VideoMovie enters the Insert Edit mode with the scene at which the VideoMovie is aimed appearing on the screen for monitoring.
6. Press Recording start/stop to insert the new sequence.
7. When the counter reading of "0" is reached, insert editing stops automatically and the VideoMovie enters the Playback mode.

Notes:

- When the tape reaches the preset edit-out point during the editing operation, it may stop slightly before or after the designated point on the tape.
- Only video signals are recorded in the Insert Editing mode. When the sound is to be recorded, press the AUDIO DUB and PAUSE/STILL buttons simultaneously in the Insert Pause mode. When INSERT/MONITOR and PAUSE/STILL buttons are pressed simultaneously again, the unit reenters the video-signal-only recording mode.

AUDIO DUBBING

Audio dubbing means recording a new soundtrack on a pre-recorded tape, i.e., replacing the original sound with new audio material.



Precautions

- Tapes with their safety tabs removed cannot be audio dubbed. Reseal the safety tab slot to perform the dubbing.
- If whistling or howling is heard during audio dubbing, reduce the TV volume or move the mike farther away from the TV.
- When dubbing from a microphone . . .
  Connect the microphone to the VideoMovie as shown on the left.

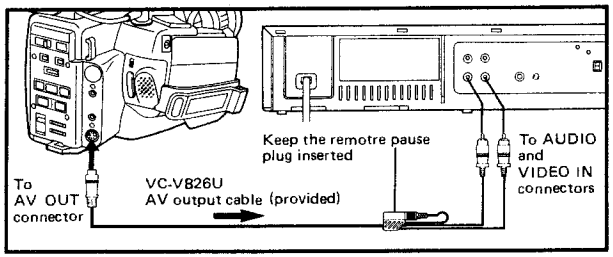
1. Locate the desired edit-out point on the VideoMovie's tape and press PAUSE/STILL.
2. Press RESET to obtain a "0" reading, then press MEMORY to obtain an "M" indication on the LCD.
3. Press REW/SHUTTLE SEARCH to locate more quickly the place on the tape you want audio dubbing to begin.
4. Press PAUSE/STILL at the exact beginning point for audio dubbing.
5. While pressing AUDIO DUB, press PAUSE/STILL to enter the Audio Dub Standby mode.
6. When you are ready with the new audio material, press PLAY to begin audio dubbing.
7. When the counter reading of "0" is reached, audio dubbing stops automatically and the VideoMovie enters the playback mode.

USING WITH ANOTHER RECORDER

For continuous documentation of longer events, the GR-60U can be used as an independent video camera in combination with either a deck-type or portable video recorder.

Using a recorder not equipped with a remote pause terminal

- Connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors of the video recorder using the provided AV output cable VC-V826U.



Operation

1. Press the INSERT/MONITOR button. The camera output signal is now available via the AV output cable.
2. Put the connected recorder in the Record mode. Recording will start. Tape start/stop should be controlled with the recorder's buttons.

Note:

- In this configuration, it is possible to obtain a continuous recording and an edited-out recording of the same event simultaneously, because the GR-60U's start/stop button only controls the tape inside itself while another tape loaded in the connected recorder continues running. To record on the GR-60U's tape, follow the same recording procedure as described before: press REC Standby and then the start/stop button.

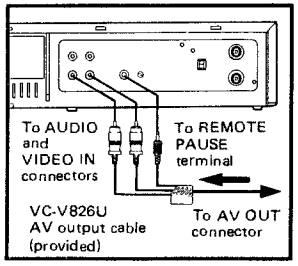
Using a recorder equipped with a remote pause terminal or with a 10-pin camera connector

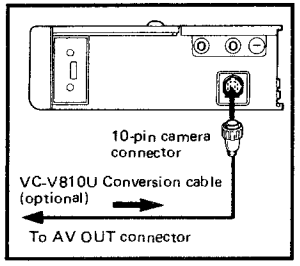
For a recorder with a remote pause terminal

- Connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors and remote pause terminal of the video recorder using the provided AV output cable VC-V826U.

For a recorder with a 10-pin camera connector

- Connect the AV OUT connector of the GR-60U to the AUDIO and VIDEO IN connectors and remote pause the optional VC-V810U conversion cable.





Operation

1. Press the INSERT/MONITOR button.
2. Set the connected recorder in the Recording Standby (Record-Pause) mode.
   - The viewfinder's mode indication corresponds to the state of the connected recorder.
3. Press the start/stop button of the GR-60U to start recording.

Note:

- To record on the GR-60U's tape as well, press the REC standby button and then the start/stop button.

Precautions

- Power is not supplied to the GR-60U from the connected VCR. Independent power supply is required for both the GR-60U and the VCR.
- If you stop recording by pressing the GR-60U's start/stop button, the connected VCR also stops in the Pause mode. However, the pause command signal is not delivered to the connected VCR in the following cases and, therefore, the VCR will start automatically:
  (1) when the GR-60U is switched off or its battery becomes discharged.
  (2) when the VC-V810U cable is disconnected.

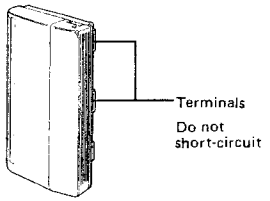
Therefore, before replacing the battery or tape for the GR-60U put the connected VCR either in the STOP or REC LOCK mode.

CHARGING THE BATTERY PACK

To charge the battery pack, use the exclusive AC power adapter/battery charger AA-V6U (provided/optional) or car battery charger BH-V5U (optional).

A WORD ON THE EXCLUSIVE BN-V5GU/V6GU/V7GU BATTERY PACKS

The BN-V5GU/V6GU/V7GU are nickel-cadmium batteries. Give attention to the following to make the most of their characteristics.



Temperature ranges

The recharging time is based on room temperature of 20°C (68°F).
The lower the temperature, the longer the recharging time.

For charging:	10°C to 35°C (50°F – 95°F)
For operating:	0°C to 40°C (32°F – 104°F)
For storing:	-10°C to 30°C (14°F – 86°F)

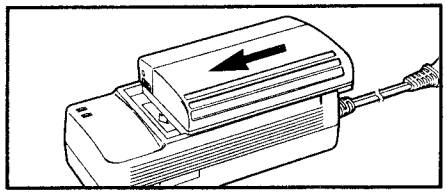
The battery pack has been kept in the uncharged state for shipment. Therefore, before use, charge it.
BE SURE TO CAREFULLY READ THE CAUTION ATTACHED TO THE BATTERY PACK.

Charging procedure

Charging time

BN-V5GU 50 min.	BN-V6GU 70 min.	
BN-V7GU 80 min.		

- The charging time differs depending on the ambient temperature and the condition of the battery pack.



1 Connect the AC power cord to a wall outlet. (The POWER indicator will light.)

2 Align the marks on the battery pack and adapter.

3 Slide the battery pack in the direction of the arrow until it locks in place.

4 When charging is completed, the CHARGE indicator that is red turns to green.

PRECAUTIONS

- If used near a radio, the provided AA-V6U AC power adapter/battery charger may interfere with reception.
- Prevent inflammables, water and metallic objects from entering the unit.
- Do not disassemble or modify the unit.
- Do not apply shocks to the unit.
- Do not subject the unit to direct sunlight.
- Avoid using the unit in extremely hot or humid places.
- Avoid using the unit in places subject to vibrations.

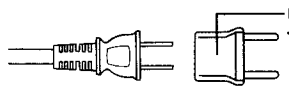
Note:
The optional BH-V5U Car Battery Charger can charge the batteries from a car battery. For details refer to the instructions of the BH-V5U.

Recording time for the GR-60U

BN-V5GU 25 min.	BN-V6GU 60 min.
BN-V7GU 80 min.	

- The recording time per charge is influenced by the duration of recording standby, frequency of zooming, etc. It is safer to have spare battery packs.

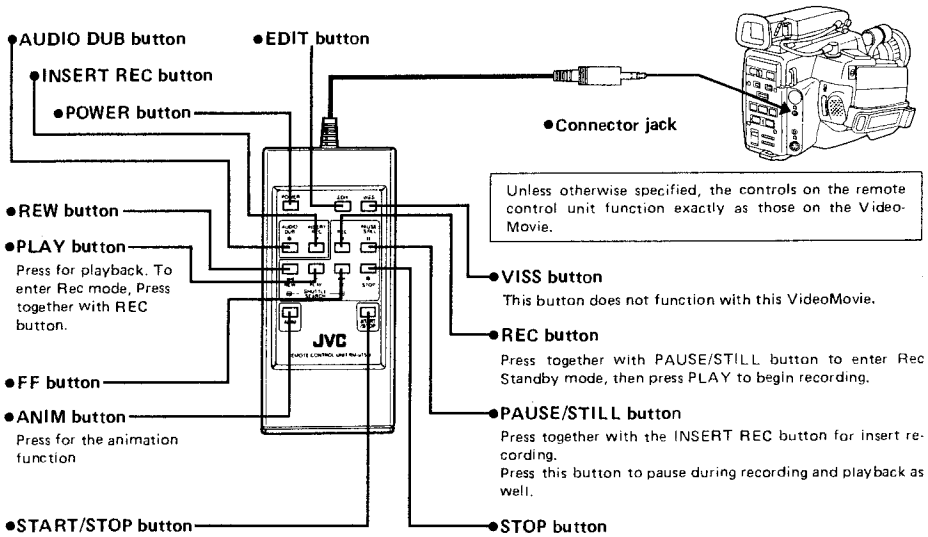
When using the AA-V6U in areas other than the USA.
USING HOUSEHOLD AC PLUG ADAPTER
In case of connecting the unit's power cord to an AC wall outlet other than American National Standard C73 series type, use an AC plug adapter, called a "Siemens Plug", as shown below.
For this AC plug adapter, consult your nearest JVC dealer.



USING THE REMOTE CONTROL UNIT (optional)

The remote control unit RM-V15U (optional) permits VCR functions to be controlled from a distance.

• Plug the remote control cable of the remote control unit into the remote connector on the VideoMovie.



Unless otherwise specified, the controls on the remote control unit function exactly as those on the VideoMovie.

•VISS button
This button does not function with this VideoMovie.

•REC button
Press together with PAUSE/STILL button to enter Rec Standby mode, then press PLAY to begin recording.

•PAUSE/STILL button
Press together with the INSERT REC button for insert recording.
Press this button to pause during recording and playback as well.

•STOP button

Note:
The Rehearsal mode cannot be engaged using this unit.

Animation function

Animation produces the illusion of movement in otherwise stationary scenes or objects. This technique is accomplished by shooting a series of slightly different pictures of the same scene or slightly different poses of the same object for a brief period of about 1/2 second. For example, you can take several shots of a doll that is moved slightly for each shot, the doll will seem alive (to be animated) when viewed during playback.

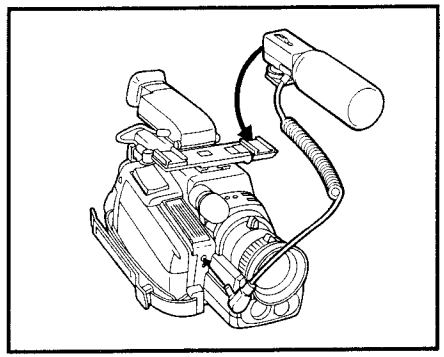
Operation

1. With the VideoMovie in the Record-Pause mode.
2. Press the ANIM button of the remote control unit RM-V15U.
   - Recording mode indicator and Pause mode indicator blinks alternately on the VideoMovie's LCD.
3. Press the Recording Start/Stop button or Play button after focusing the camera on a subject.
4. Recording stops automatically in the Record-Pause mode after about 1/2 second.
5. Repeat step 3 for the required number of shots.
6. Playback the recorded series to check if results were satisfactory.

Notes:
- The Animation mode can only be engaged from the Record-Pause mode.
- Before recording in the Animation mode at the very beginning of a tape, set the VideoMovie to the Record mode for about 5 seconds, in order that the tape runs smoothly. Using the Fade-in function at this point is a good way to begin an animated program.
- During an Animation sequence, fading cannot be engaged.
- Release the Animation mode by pressing the ANIM button or the STOP button.
- If recorded background sound is undesirable, use the Audio Dubbing function to erase or replace it.
- When playing back an animated recording, the color may be unstable with some TVs.

SHOE ADAPTER (optional)/ CARRYING HANDLE (optional)

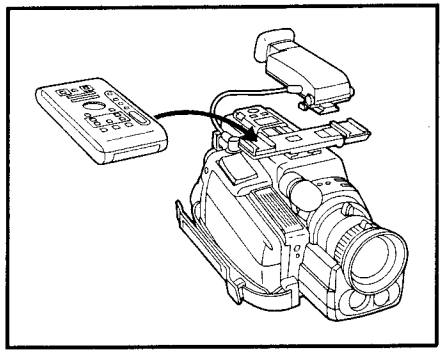
Attaching external microphone using shoe adapter.



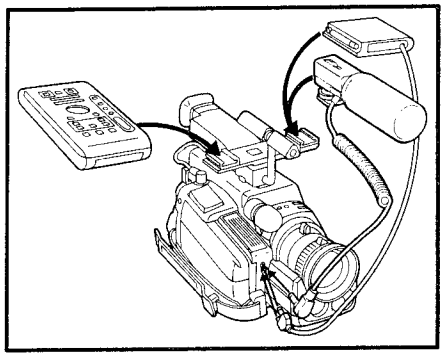
CAUTION
- Do not attach a video light, its heat could cause malfunctioning of the GR-60U.

Notes:
- Do not adjust the viewfinder angle while using a shoe adapter.
- Keep carrying handle in up position while attaching accessories.
- Run the microphone cord behind the shoe adapter.

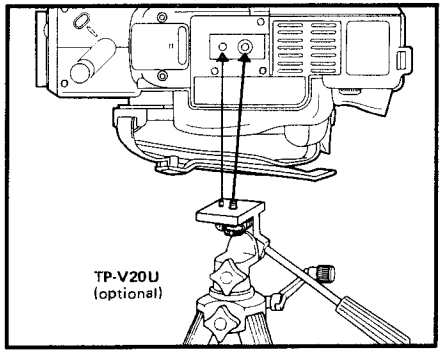
Attaching character generator using shoe adapter.



Attaching character generator and external microphone using shoe adapter and carrying handle.



TRIPOD MOUNTING



Align the screw and camera direction stud of the tripod with the camera's tripod mounting socket and stud hole, and firmly tighten the screw.

SUPPLEMENTAL INFORMATION

What is "color tamperature"?

Light is composed of various color components in different proportions. A relationship exists between the temperature of a light source and the color components of the emitted light; as the temperature rises, the color of the light varies from red, orange, yellow, white to blue in that order. "Color temperature" is a value that expresses differences in color among light sources, measured in Kelvin degrees. Bluish light has a higher color temperature than reddish light.

What is "white balance"?

Making the colors look natural on TV is what white balance is all about. Because a camera is not as adaptable as the human eye, if a light source is reddish, white subjects in htat light are recorded as reddish. White balance adjustment is performed to compensate for color temperature variations of light so that whites are reproduced as white. Correct white balance makes all other colors correct. The GR-60U can perform automatic white balance adjustment. However, if illumination is insufficient, white balance adjustment cannot be performed. To obtain correct colors, therefore, sufficient illumination is essential.

What is "illuminance"?

Illuminance" (also called "luminance") is the intensity or brightness of light, expressed in lux or foot-candles (fc). The GR-60U is designed to provide best pictures under the conditions of a 700-lux (67 fc) illuminance, although shooting is possible all the away down to 8 lux (0.8 fc). To obtain good pictures in very bright light, the use of an ND (neutral density) filter is recommended. (See chart on this page.)

How to good color pictures

The simplest way is to provide sufficient lighting (close to the camera's reference illuminance) and accurately adjust the camera to the color temperature of that lighting. If light sources of different color temperatures are used together, accurate white balance adjustment is very difficult. For example, if natural lights is mixed with artificial light, which is likely to occur next to windows, correct colors of the subject are difficult to obtain. It is recommended in such cases that curtains in the room be closed to shut out light from outside. Also, when artificial lighting devices are used, they should all have the same color temperature. For example, it is recommended that incandescent or halogen lamps not be used together with fluorescent lighting.

Color temperatures of various artificial lighting

Type of illumination		Color temperature
Tungsten lamp for home use		2800 K
Tungsten lamp for photographic use		3200 K
Quartz-halogen lamp		
Blue lamp for photographic use		5000 K
Fluorescent lamp	Warm white	3500 K
	White	4500 K
	Daylight type	6500 K

Illuminance chart

- The values on this chart are approximated to give you a rough reference.

	Unit: Lux (fc)	
ND filter desired	100,000 (9,300)	• Clear sky, mid-day, under sunlight (100,000/9,300)
Range for practical use		• Clear sky (10:00 a.m.) under sunlight (65,000/6,045)
		• Clear sky (3:00 p.m.) under sunlight (35,000/3,255)
		• Cloudy sky (mid-day) under sunlight (32,000/2,976)
		• Cloudy sky (10:00 a.m.) under sunlight (25,000/2,325)
	10,000 (930)	
		• By the window during the afternoon (3,500/324)
	2,000(190)	• Cloudy sky (one hour efter sunrise) (2,000/190)
	1,000(94)	• Clear sky (one hour before sunset) (1,000/94)
	600(55)	• Counters at department stores (500 – 700/47 – 66)
	500(47)	• Bowling center (600/47)
Lighting desired		• Office under fluorescent light (400 – 500/37 – 47)
		• Library (400 – 500/37 – 47)
		• Direct light of a flashlight at 1m (3 ft) distance (250/22.7)
	100(9)	• Streetlights at night (150 – 200/13.5 – 18)
	80(7.3)	
	Minimum lighting for an object	
	16(1.4)	• Cigarette lighter (at a distance of 30 cm/11.8 in) (16/1.4)
	10(1)	• Candlelight (at a distance of 20 cm/7.9 in) (10 – 15/1 – 1.4)

SYSTEMS FLEXIBILITY

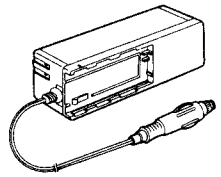
For maximum enjoyment, make the most of the provided or optional accessories depending on the situation.

•Regular battery pack BN-V5GU
Pages 9 and 27

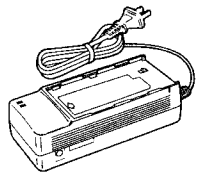
•High-capacity battery pack BN-V6GU
Pages 9 and 27

•Super High-capacity battery pack BN-V7GU
Pages 9 and 27

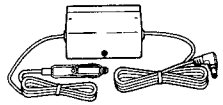
•Car battery charger BH-V6U
Pages 9 and 27
Use to charge the battery pack, or power the GR-60U using a car battery.



•AC power adapter/battery charger AA-V6U
Pages 9 and 27
Use to power the GR-60U with household AC current or charge the battery pack.

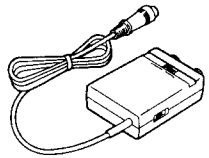


•Car battery cord AP-P1U
Page 9
For power supply from a car battery.

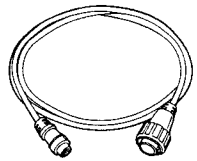


•A/V extension cable VC-P1U
Use to extend the A/V cable.

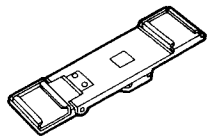
•RF unit RF-V3U
Pages 22 and 23
Use to connect the GR-60U to a regular TV receiver for playback.



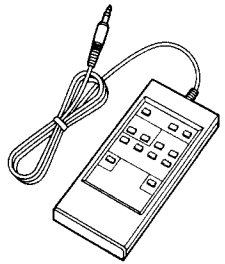
•Conversion cable VC-V610U
Page 26
For connecting the GR-60U to a VCR with a 10-pin camera connector.



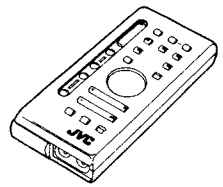
•Shoe adapter CU-V410U
Page 29
Use to attach microphone, character generator etc.



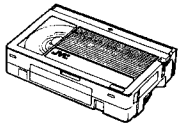
•Remote control unit RM-V15U
Page 26
Controls VideoMovie's VCR functions from a distance.



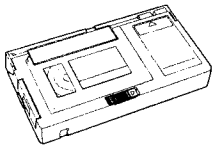
•Character generator CG-P50U/ CG-V60U
Page 29
Allows superimposition of titles, dates and lap time during recording.



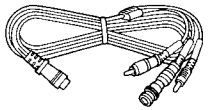
- **Compact video cassette TC-20**
  Page 4
  Allows 20 minutes of recording and playback in SP mode, and 60 minutes of recording and playback in EP mode.



- **Cassette adapter C-P5U**
  Page 32
  Enables the TC-20 compact video cassette to be used with regular VHS machines.

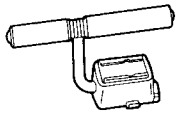


- **AV output cable VC-V826U**
  Pages 23, 24 and 26
  Use to connect the GR-60U to television set equipped with audio/video input connectors for playback, or to a second video recorder for dubbing.

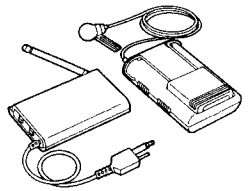


- **Carrying bag CB-V22U**
  Use to carry the GR-60U together with basic accessories.

- **Carrying handle VU-V130U**
  Use to carry GR-60U.



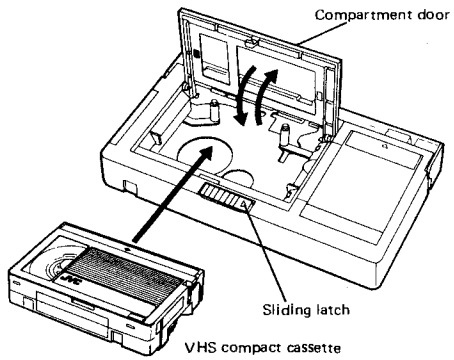
- **Wireless microphone unit WM-V1U**
  Allows remote sound recording, for expanded movie-making flexibility.



USING THE CASSETTE ADAPTER (provided)

The VHS compact video cassettes recorded with the GR-60U can be played back with a standard VHS machine by using the provided C-P5U Cassette Adapter.
(A compact video cassette installed in the cassette adapter is fully compatible with a standard VHS machine for both recording and playback.)

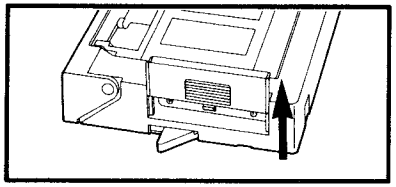
- **C-P5U Cassette Adapter**
  Being battery-operated, the C-P5U performs tape loading and unloading automatically.



Note:
- During special-effects playback (slow motion, still frame, etc.) the picture may vibrate or noise bars may appear on the screen.

- **Inserting the battery into the cassette adapter**

Remove the battery cover by sliding it up.
Install one "AA" battery and reattach the cover.



IN CASE OF DIFFICULTY

What may initially appear to be trouble is not always a real problem. Make sure first . . . .

Symptoms	Check points
Power	
No power is supplied.	●Is the battery pack correctly installed? ●Is the battery pack charged? ●Is the power supply unit correctly connected? ●Is the POWER switch of the connected AC adapter set to ON?
Recording	
Recording is impossible.	●Check to see if the cassette safety tab is in place. See page 4.
Picture colors greatly differ from actual subject colors.	●If in the manual white balance mode, check the setting of the ☼ / 📷 / ☼ button.
No sound is recorded with an external microphone.	●Is the microphone's switch set to ON?
Recording does not start.	●Have you pressed the REC standby button first?
Playback	
Tape is running, but no playback picture appears.	●Is the VIDEO/TV switch of the RF unit set to VIDEO? ●Is the TV receiver set to channel 3 or 4? ●If A/V connection is used, is the TV's VIDEO/TV switch set to VIDEO?
Noise bars appear in the playback picture	●Use the TRACKING control to reduce noise bars.
Playback picture is blurred or interrupted white TV programs received are clear.	●Video heads may be dirty or worm out. For head cleaning or replacement, consult the nearest JVC Service Dealer.
Tape transport	
Tape stops during fast forward or rewind	●Is the "M" indication visible on the LCD? If so, press the MEMORY button to cancel the memory function.
Rewinding or fast forwarding is impossible.	●Check to see if the tape has already been fully wound on one reel or the other.
Other	
No function is available with more than two mode indicators lit.	●If this should happen when using power supply units other than the battery pack, turn their POWER switch on and off. With a battery pack, replace it with another charged one.
Vertical white lines appear when shooting a very bright object.	●This may occur when the background contrasts very much with the object. This is normal.

The GR-60U is a microcomputer-controlled device. External noise and interference might prevent it from functioning properly. In such cases, first disconnect its power supply unit (battery pack, AC power adapter, etc.); and then reconnect it and proceed as usual from the beginning.

SECTION 1
SERVICE CAUTIONS & DISASSEMBLY

1.1 PRECAUTIONS

1. Disconnect the power from the set before disassembling/re-assembling it and soldering parts.
2. When removing/installing fasteners such as screws, washers, etc., be careful not to drop them into the mechanism.
3. When disconnecting/connecting connectors, pay enough attention to wiring not to damage it.
4. In general, resistors, shorting jumpers (0-ohm resistors), ceramic capacitors and diodes are chip parts, which can not be reused after they are once removed. (Refer to Section 1.3.)
5. When installing parts, be careful not to do with other parts as well as not to damage others (pay the most careful attention to the video head assembly and the tape transport mechanism).
6. Pay enough attention to the CCD image sensor and the optical filters so that they won't be dusty, soiled or damaged. If it is soiled with fingerprints, etc., gently clean with silicone lens tissue.
7. When removing ICs, be careful not to damage circuit patterns.

1.2 REQUIRED TEST EQUIPMENT, FIXTURES/ TOOLS AND OTHERS

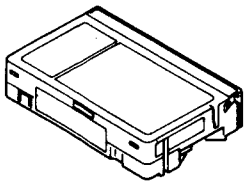
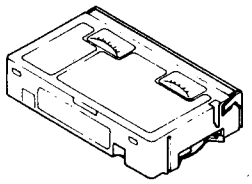
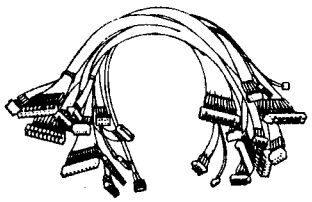
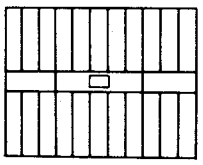
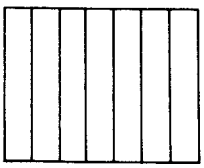
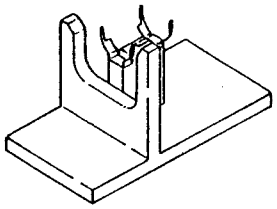
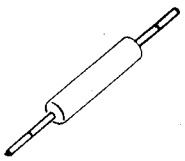
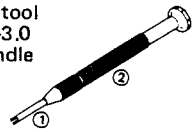
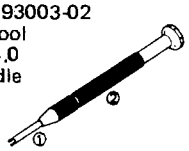
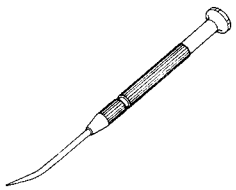
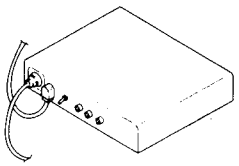
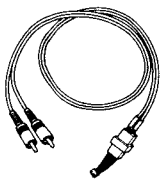
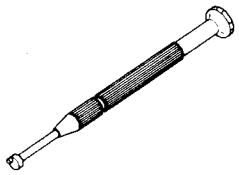
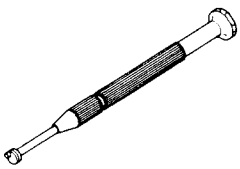
For proper measurement, adjustment and maintenance, the following test equipment, fixtures/tools are strongly recommended to use.

1.2.1 Test equipment, etc.

1. Color video monitor
2. AC power adapter (AA-V6 or equivalent)
3. Oscilloscope (dual-trace type)
4. Frequency counter
5. Audio tester
6. Vectorscope
7. Halogen lamps

S. 52 mm dia. filters :
ND8, C8, C12, C15, C24, CC10Y, W4, W14

1.2.2 Special test equipment and tools required for adjustments

Alignment tapes MH-C1, MHP-LC	Cassette torque meter PUJ50431-2	Patch cord set YTU93025A	Gray scale pattern (GS-2A) Reflection type, 11 steps, $\gamma = 2.2$
			
Color bar pattern (CC-2A) Reflection type, 7 colors	Auto focus unit Back focus adjusting chart PUJ93944	Camera adjusting mount YTU93010A-2	Adjusting jig for compact VTR YTU93004-2
			
Chip parts replacing tool YTU93003A (incl. ① & ②)	Chip parts replacing tool YTU93003B (incl. ① & ②)	Chip IC replacing tool PTS40844	Y/C separator PUJ25579
① YTU93003-01 Bit tool ② PD-3.0 Handle  Orders for ① end ② can be placed separately.	① YTU93003-02 Bit tool ② PD-3.0 Handle  Orders for ① and ② can be placed separately.		
Cable for Y/C separator YTU93006	Back-focus edjusting tool PUJ37186A (for master lens)	Back-focus adjusting tool PUJ37186B (for auto focus)	
			

Note:

1. Adjustment can be performed without the patch cord set, however, it is recommended to use the following two for a convenience.
   1) YTU93025-25 (for connection of the operation unit)
   2) YTU93025-10 (for connection of the TRIGGER board)
2. When the camera is used for a video signal generator, the Y/C separator and the Y/C separator cable are unnecessary.

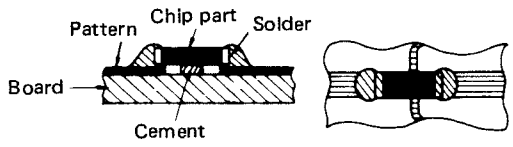
1.3 REPLACEMENT OF CHIP PARTS

For replacing chip parts, proceed as follows.
Use a well-insulated fine-tipped soldering iron (approx. 17 W, 130°C ~ 260°C in temperature).
In addition, it is recommended to use a soldering iron with solder absorber (55 W approx.) for concenience.

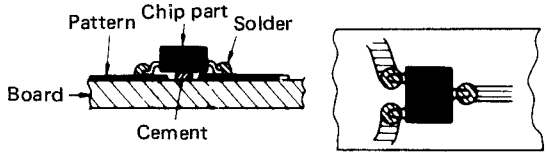
Caution:
- Do not apply heat for more than 3 seconds.
- Do not rub electrodes.
- Do not reuse chip parts removed once.
- Supplementary cementing is not required.

1.3.1 Soldered condition of chip parts

- Resistors, capacitors, etc.



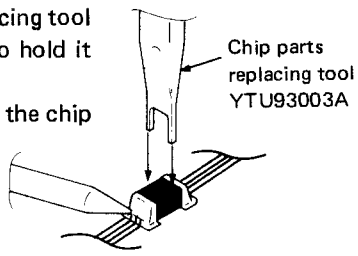
- Transistors, diodes, etc.



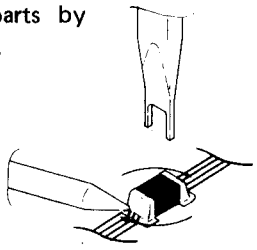
1.3.2 How to remove chip parts

- Resistors, capacitors, etc.

1. Set a chip parts replacing tool onto the cip parts to hold it down.
2. Unsolder at a side of the chip parts.

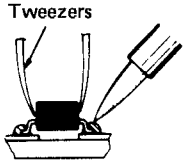


3. Remove the chip parts by twisting and sliding it.

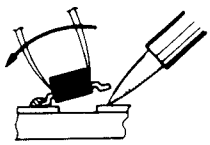


- Transistors, diodes, etc.

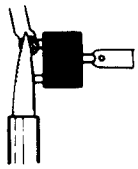
1. Unsolder at the one-lead side of the chip parts.



2. Lift the unsoldered side upward.



3. Heat the other two leads simultaneously and remove the chip parts upward.

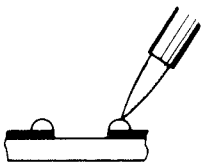


1.3.3 Preheating and soldering chip parts

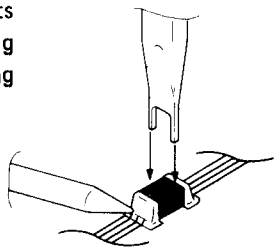
Just before soldering new chip parts except transistors, but capacitors especially, preheat them with hot air (150°C approx.) by use of a blower type of hair dryer for about 2 minutes. Immediately after that, solder it with a soldering iron of 30 W approx.

1.3.4 How to set and solder chip parts

1. Presolder the contact points of the circuit pattern to which the chip parts will be soldered.

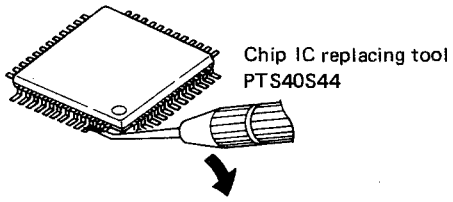


2. Holding down the chip parts with the chip parts replacing tool, solder it with a soldering iron.



1.4 REMOVING OF FLAT ICs
(Recommendable manner)

1. For removing solder chips from IC's pins, use a solder remover or a wiry solder absorber.
2. Heat the IC's tips evenly by moving the chip IC replacing tool around them, and detach the IC's leads with the tool in the way of using a lever.
3. Do not reuse ICs removed once. (Discard them.)



1.5 DISASSEMBLY OF CAMERA SECTION

1.5.1 Electronic viewfinder (E. VF)

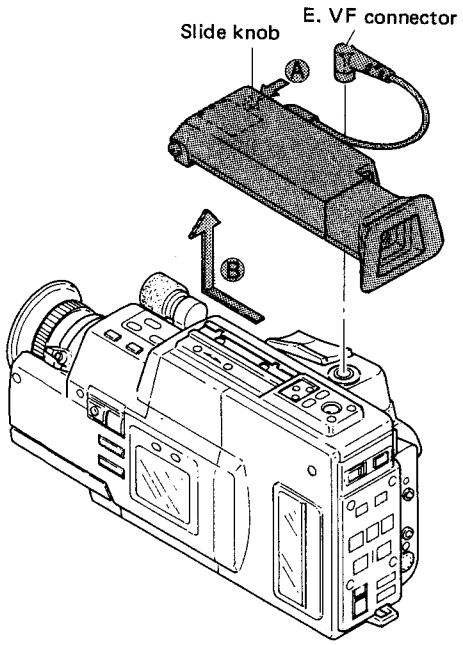


Fig. 1-5-1 Electronic viewfinder

1. Disconnect the E. VF connector from the main body first, then, pushing the slide knob Ⓐ in the direction of the arrow mark, slide the E. VF in the direction of the arrow mark Ⓑ to detach it.

1.5.2 E. VF shoe & shoe cover

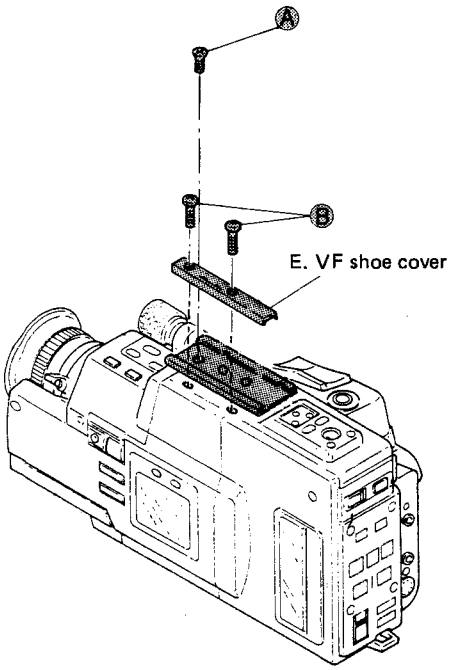


Fig. 1-5-2 Shoe cover

1. Remove screws Ⓐ and Ⓑ, and take off the E. VF shoe cover.

1.5.3 Cassette cover

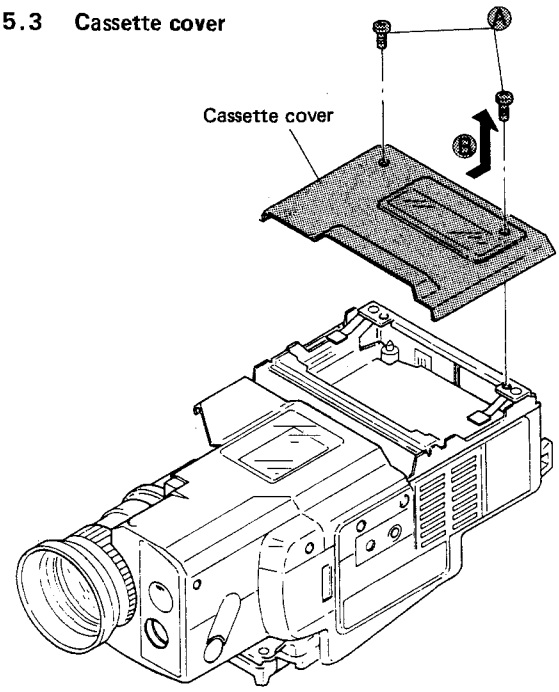


Fig. 1-5-3 Cassette cover

1. After removing the screws Ⓐ, slide the cassette cover in the direction of the arrow Ⓑ to take if off.

1.5.4 Upper case & Front cover

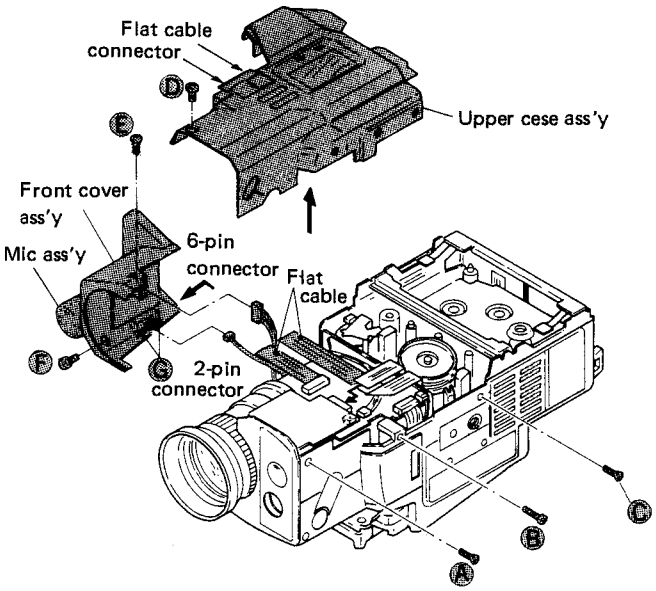


Fig. 1-5-4 Upper case and front cover

1. Remove screws Ⓐ, Ⓑ, Ⓒ, Ⓓ, Ⓔ and Ⓕ.
2. After removing all the screws, take off the upper case ass'y and the front cover ass'y by pulling them in the directons of the arrow marks, respectively.
3. Gently disconnect the 2-pin and 6-pin connectors from the front cover ass'y and remove screws Ⓖ, then, the mic ass'y can be separated.
4. Since the upper case ass'y and the main body are connected with flat cables, unlock the connectors and disconnect them.

1.5.5 Front panel

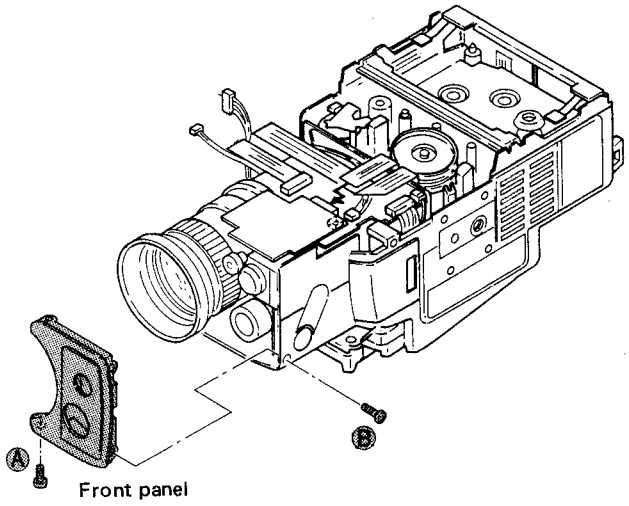


Fig. 1-5-5 Front panel

1. Remove screws Ⓐ and Ⓑ, and take off the front panel.

1.5.6 Base assembly

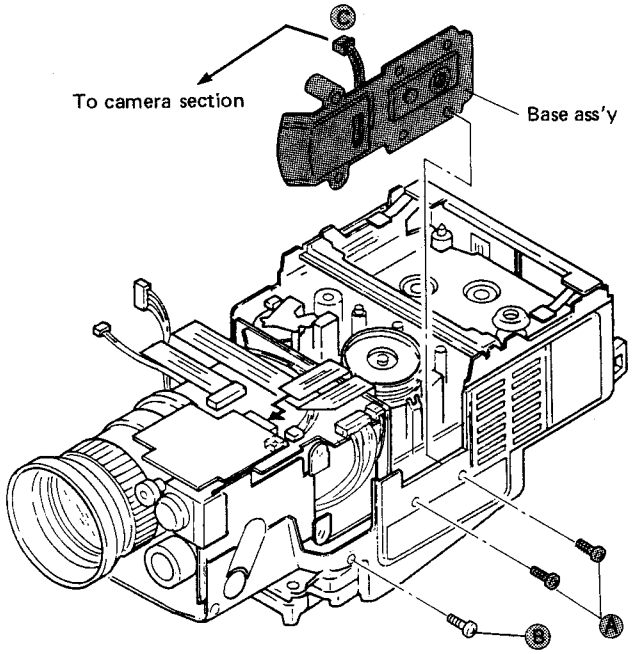


Fig. 1-5-6 Base ass'y

1. Remove screws Ⓐ and Ⓑ, and disconnect the connector Ⓒ which is connected to CN409 of the INDICATOR board of the camera section.
2. Then, take off the base ass'y.

1.5.7 Camera section

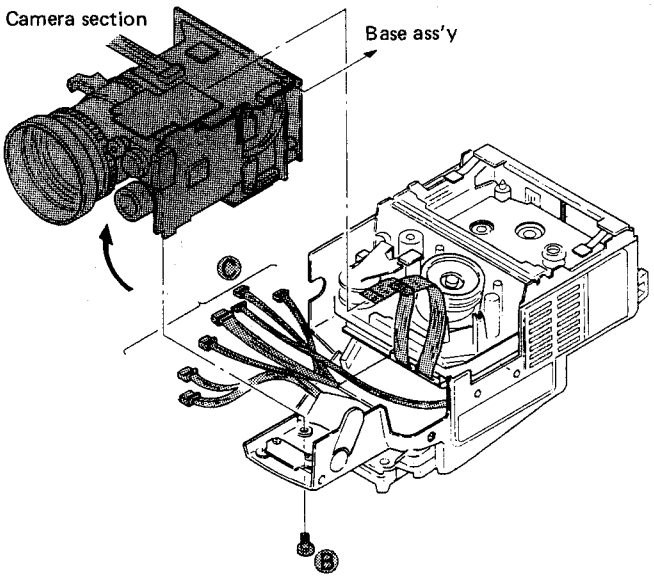


Fig. 1-5-7 Camera section

1. Remove the screw Ⓑ and disconnect the connectors and flat cables (shown by Ⓒ), then, gently take the camera section out of the lower case.

1.5.8 P.C. boards of camera section

- **Names of P.C. boards**

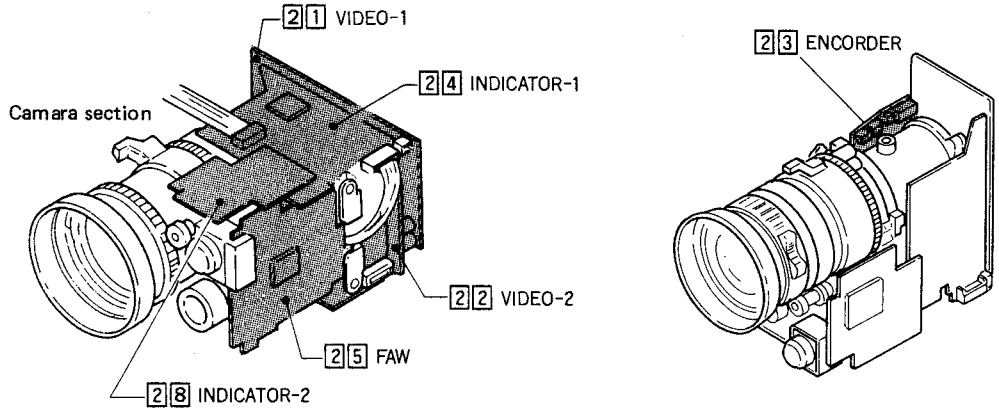


Fig. 1-5-8 P.C. boards of camera section

1.5.9 Setup for troubleshooting and checkup of camera section

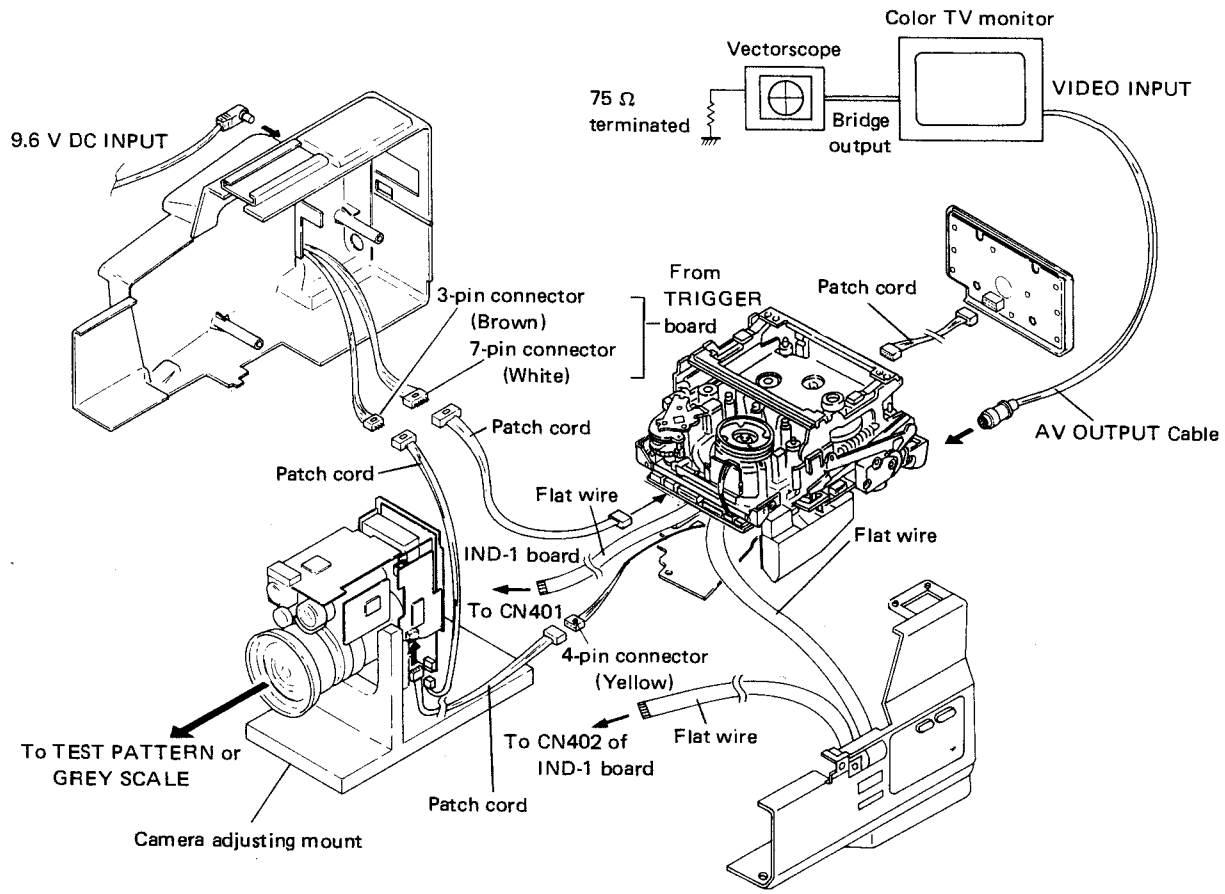


Fig. 1-5-9 Setup of camera section

1. To drive only the camera section disassembled from the main body for troubleshooting and checkup, it is recommended to use a camera adjusting mount.
2. Connect patch cords and flat cables of the connectors check up operation of the camera section with 9.6 V DC power supply.

1.5.10 FAW and INDICATOR-2 boards

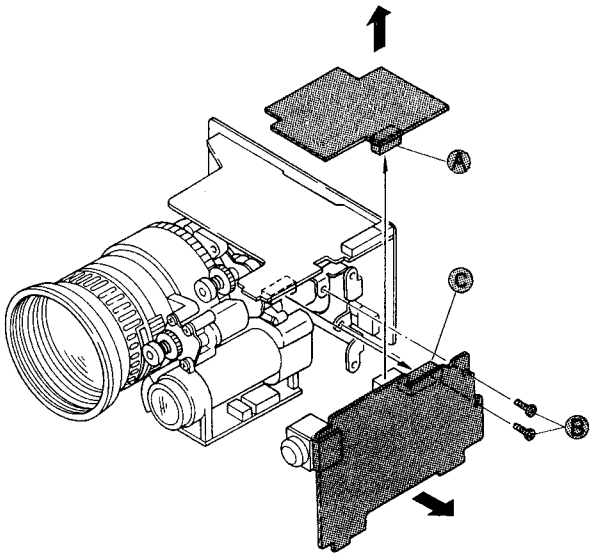


Fig. 1-5-10 Removing of boards (1)

1. Pull off the connector Ⓐ in the direction of the arrow mark, then, the INDICATOR-2 board can be removed.
2. Remove the screws Ⓑ and disconnect the connector Ⓒ in the direction of the arrow mark, then the FAW board can be removed.

1.5.11 INDICATOR-1 and ENCODER boards

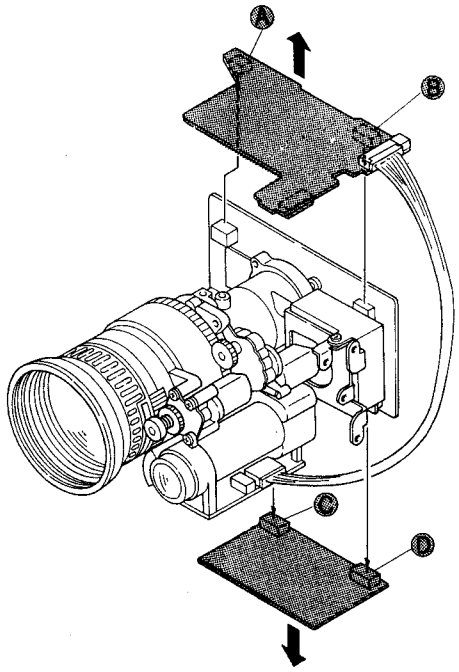


Fig. 1-5-11 Removing of boards (2)

1. Disconnect the connectors Ⓐ, Ⓑ, Ⓒ and Ⓓ in the directions of the arrow marks respectively, then the INDICATOR-1 and ENCODER boards can be removed.

1.5.12 DC-DC CONVERTER and VIDEO-2 boards

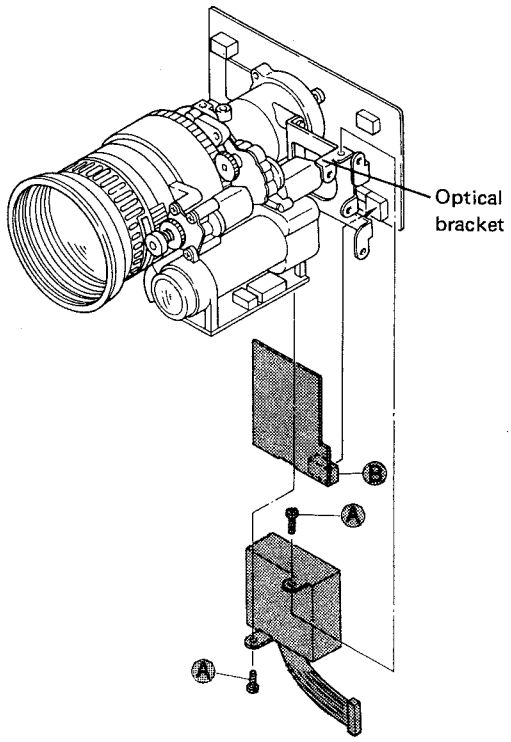


Fig. 1-5-12 Removing of boards (3)

1. Remove the screws Ⓐ and take off the DC-DC CONVERTER from the optical bracket.
2. Disconnect the connector Ⓑ and disassemble the VIDEO-2 board from the VIDEO-1 board.

1.5.13 Replacement of image sensor

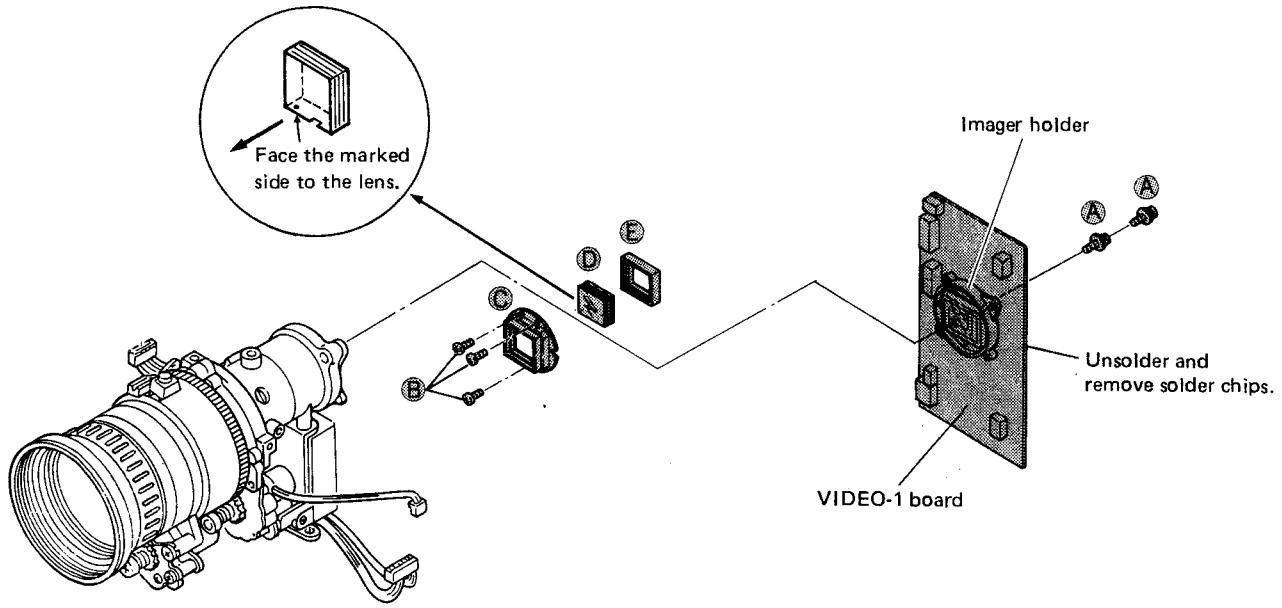


Fig. 1-5-13 (A) Removing of image sensor (1)

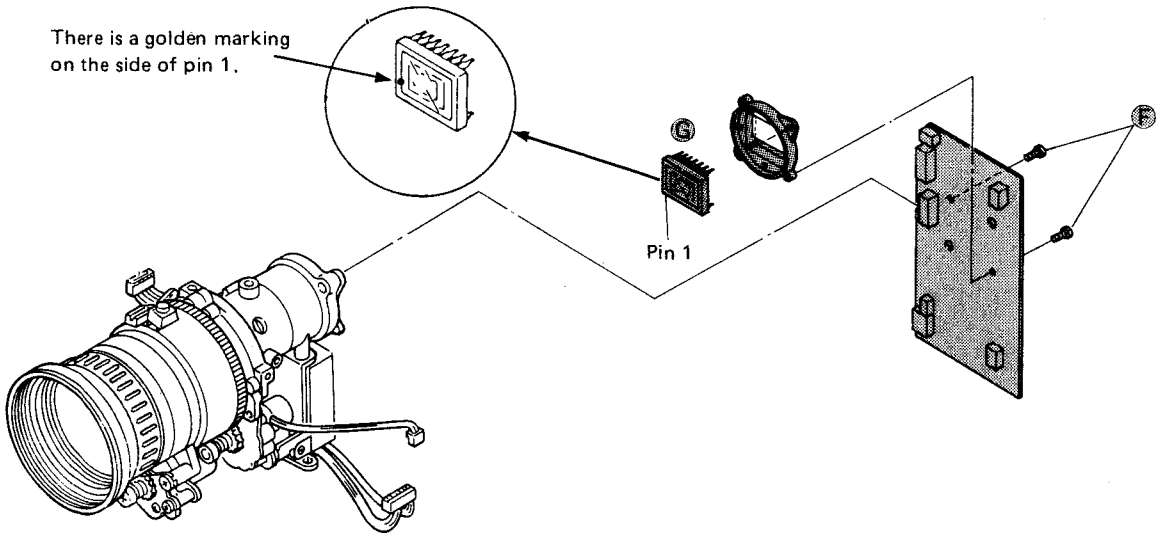


Fig. 1-5-13 (B) Removing of image sensor (2)

- **Disassembly of image sensor from optical block**

1. Remove two screws Ⓐ and take off the VIDEO-1 board together with the imager holder.
2. Remove the screws Ⓑ and take off the optical LPF holder Ⓒ, optical LPF Ⓓ, and space rubber Ⓔ.
3. Unsolder the CCD image sensor and remove two screws Ⓕ, then, take off the CCD image sensor Ⓖ.

- **Installing a new image sensor**

1. After removing the protection seal from a new CCD image sensor Ⓖ, install it to the VIDEO-1 board.
   At that time, make sure to set it so that the marking on the side of pin 1 is positioned on the lower left as viewed in the figure.
2. After the CCD image sensor is set on the VIDEO-1 board, secure it by soldering. Be careful not to apply excessive heat to the sensor and the board at that time.
3. Next, set the space rubber Ⓔ, optical LPF Ⓓ (to face the marking toward the lens), optical LPF holder Ⓒ, and fix them with three screws Ⓑ.
4. Install the VIDEO-1 board together with the imager holder to the optical block, and temporarily fix it with two screws Ⓐ so lightly as it can be moved.
5. Install the INDICATOR-1 and -2, and ENCODER boards. Picking up an object (test pattern) in the macro-focus, adjust setting position of the VIDEO-1 board so that no vignetting is observed at any corner of the image.
   Next, make sure of horizontality of the image by eyes. If the image is kept nearly horizontally by fine-adjustment, tighten the two screws Ⓐ.
6. After all of the above works are completed, perform confirmation of back focus (Section 3.5).

1.5.14 Zoom motor and Focus motor

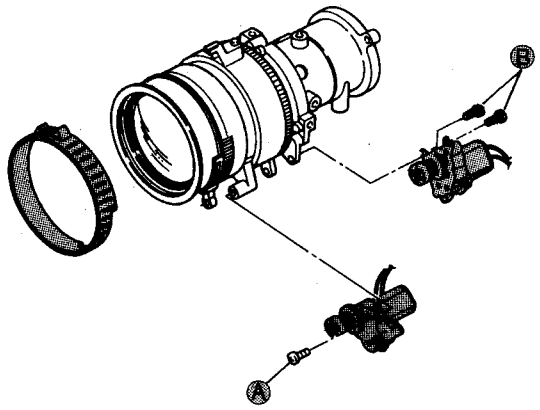


Fig. 1-5-14 Zoom and focus motors

1. Remove the screw Ⓐ and disassemble the focus motor from the lens unit.
2. Remove the screws Ⓑ and disassemble the zoom motor from the lens unit.

1.5.15 AF unit

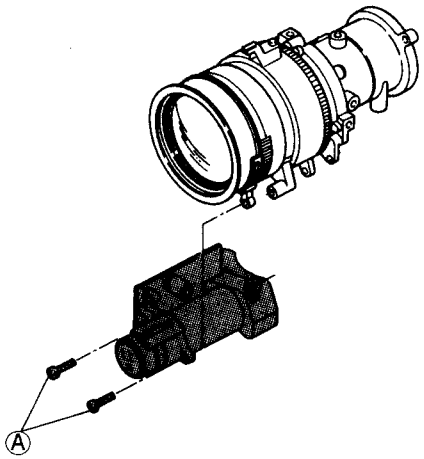


Fig. 1-5-15 AF unit

1. Remove the screws Ⓐ and disassemble the AF unit from the lens unit.
   When re-assembling them, set the projection of the AF lens into the groove of the focus lens.

1.5 DECK SECTION

1.6.1 Operation unit

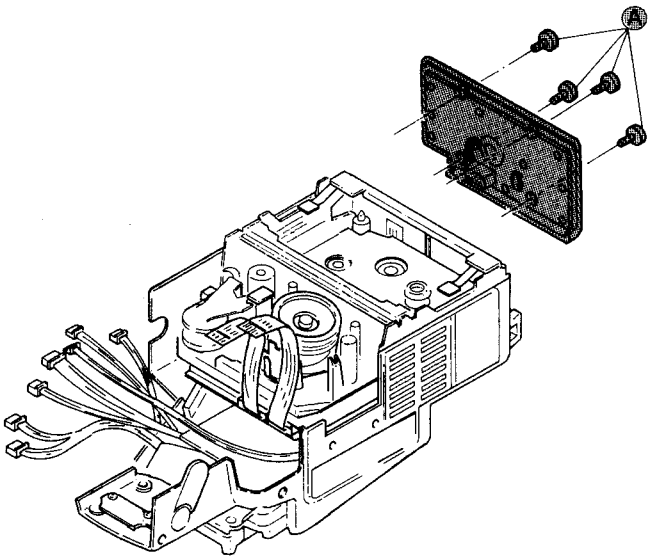


Fig. 1-6-1 Operation unit and shoe

1. Remove the screws Ⓐ and take off the operation unit.

1.6.2 Screws securing the deck section

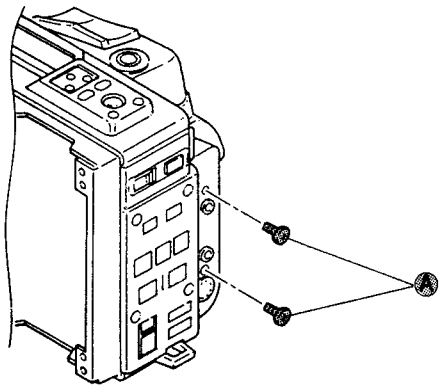


Fig. 1-6-2 Screws securing deck section

1. Remove the screws Ⓐ which fix the deck section under the A/V input connector.

1.6.3 Deck section

1. Remove the screws Ⓐ , Ⓑ and Ⓒ .
2. Disconnect the conneotors Ⓔ and Ⓕ. Holding a part near the cassette housing upward, take off the deck section gently in the direction of the arrow mark.

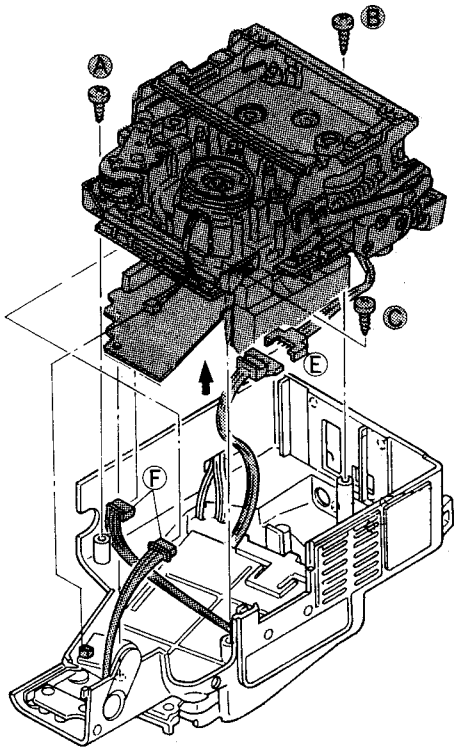


Fig. 1-6-3 Exposured deck section

1.6.4 Setup for troubleshooting and checkup of deck section

1. To drive only the deck section disassembled from the main body, connect the patch cords Ⓐ, Ⓑ and Ⓒ and check up operations with 9.6 V DC power supply.

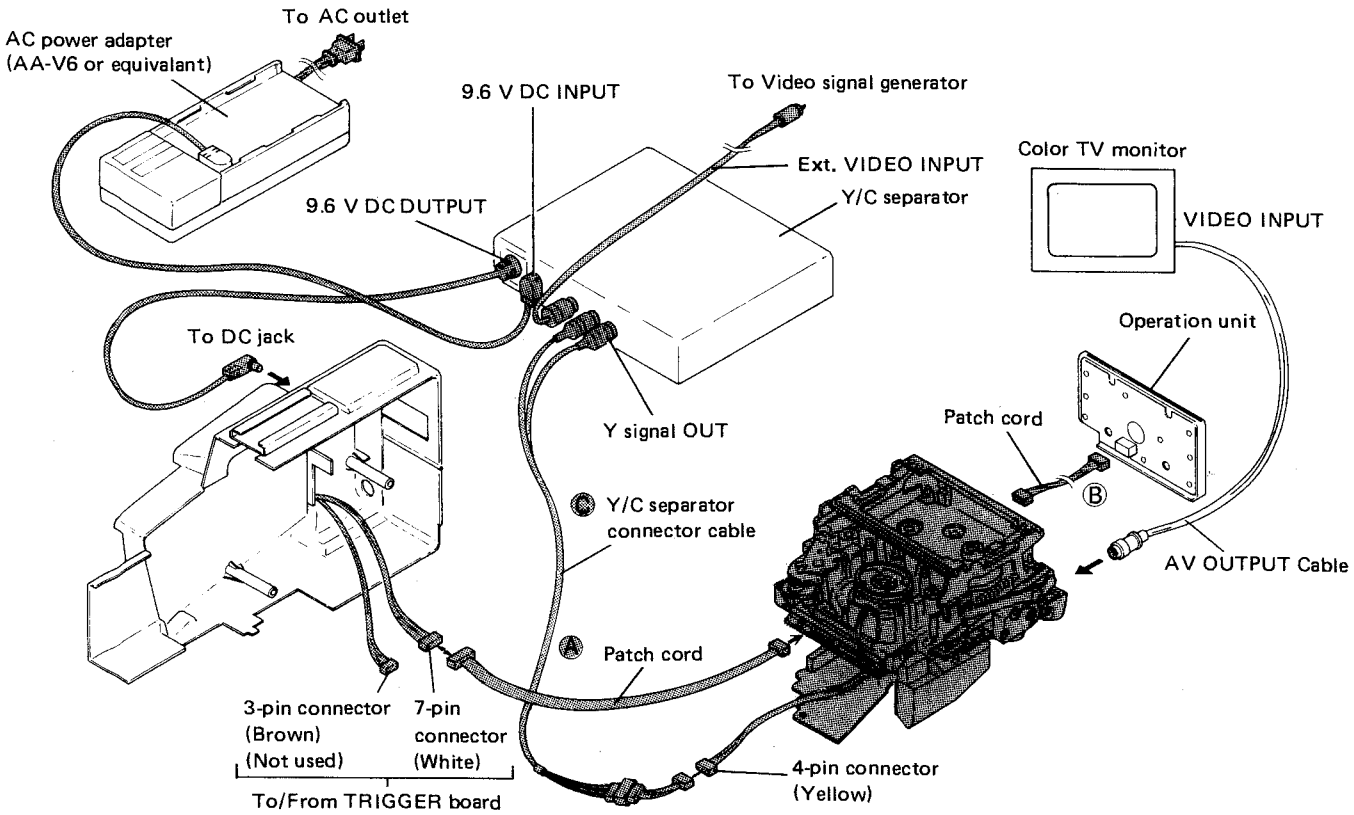


Fig. 1-6-4 Standard setup for deck section adjustment

1.6.5 Y/C board

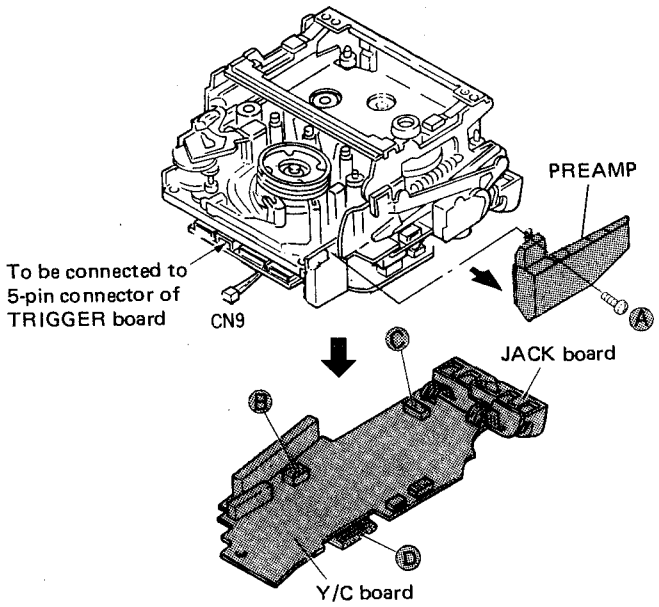


Fig. 1-6-5 Y/C board

1. Remove the screw Ⓐ and pull off the PREAMP board in the direction of the arrow mark.
2. To take off the Y/C board, pull the connectors Ⓑ, Ⓒ and Ⓓ in the direction of the arrow mark for disconnection.

1.6.6 MAIN board

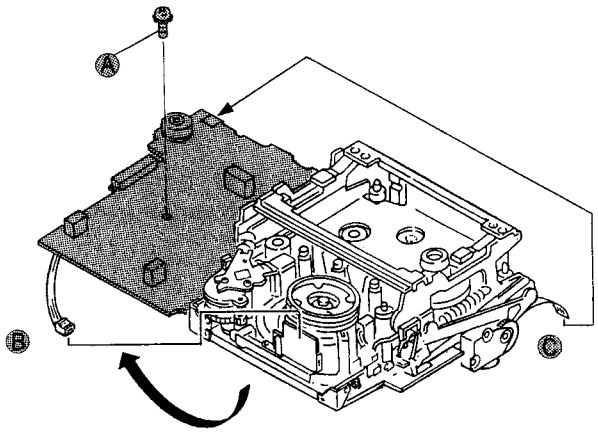


Fig. 1-6-6 MAIN board

1. Remove the screw Ⓐ.
2. Disconnect the connector Ⓑ from CN2 of the OSC board and the flexible wire Ⓒ from CN2 of the MAIN board.
3. Open the MAIN board in the direction of the arrow mark.

1.6.7 SENSOR board and Cassette housing

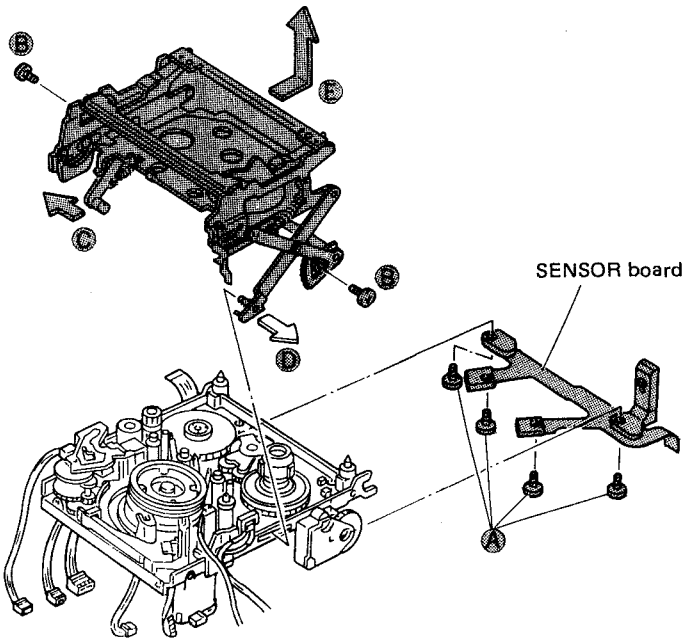


Fig. 1-6-7 SENSOR board and cassette housing

1. Remove the screws Ⓐ and take off the SENSOR board.
2. Remove the screws Ⓑ and expand the stays of the cassette housing in the directions of Ⓒ and Ⓓ to disengage the rods. Then, take off the cassette housing by lifting it in the direction of Ⓔ.

1.6.8 Replacement of drum assembly

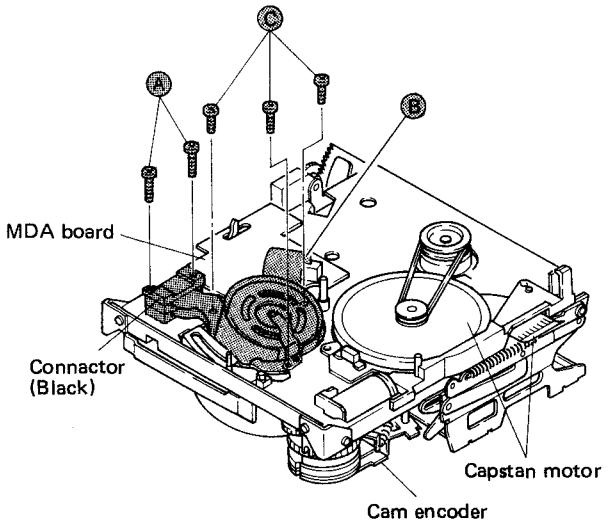


Fig. 1-6-8 Removing of drum ass'y (1)

1. Remove the screws Ⓐ and disconnect the FPC cable from the connector (black).
2. Disconnect the flexible wire Ⓑ from CN2 of the MDA board.
3. By removing the screws Ⓒ, the drum ass'y can be taken off.

Note: • The brush need not be removed.
• Since the drum ass'y is movable after the screws Ⓑ were removed, be the most careful not to damage or scratch it.

• Drum ass'y detached from the deck section

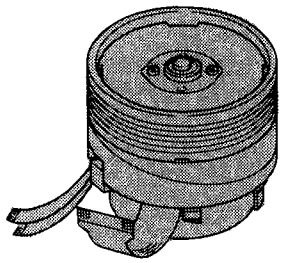


Fig. 1-6-9 Removing of drum ass'y (2)

1.6.9 Replacement of upper drum

Caution: Be careful not to touch the head of a new upper drum as well as not to damage the drum.

1. For replacement, unsolder 8 points (shown by arrows in the figure) near the center of the upper drum board, and remove the two screws.

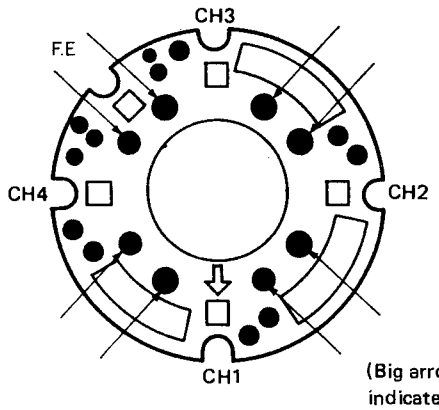


Fig. 1-6-10 Upper drum board

2. To remove the existing upper drum, fit it out with a jig provided with a new upper drum as shown in Fig. 1-6-11.

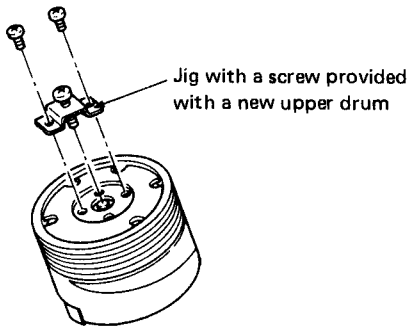


Fig. 1-6-11 Removing of upper drum

3. Before installing a new upper drum, insert a soldering iron of 50 W into the hole of the upper drum and heat it for 3—5 minutes to expand it.

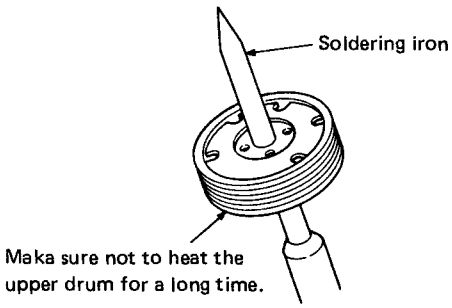


Fig. 1-6-12 Installation of upper drum (1)

4. For installing a new upper drum, set it so that the CH-2 hole coincides with the hole of the lower drum (see Fig. 1-6-13).
   Before assembling the upper and lower drums, make sure to clean their contact surfaces with alcohol.

Note: The position of CH-1 is indicated by the arrow mark on the drum board (see Fig. 1-6-10).

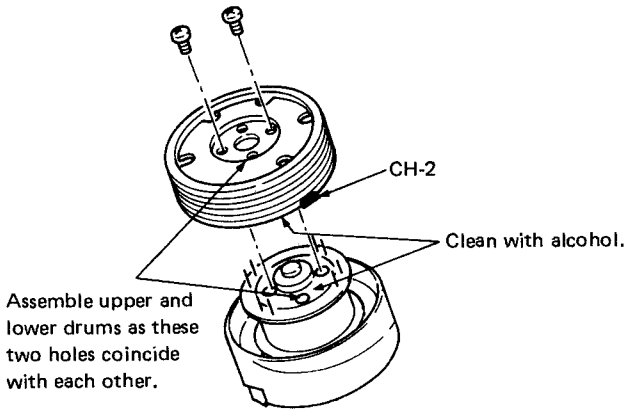


Fig. 1-6-13 Installation of upper drum (2)

5. First, tighten the screws temporarily. After the upper drum is cooled down, tighten the screws alternately and evenly.
6. After the upper drum is replaced, perform sec. 2.3 "servo circuit and interchangeability" adjustment and confirmation of sec 2.4.

1.6.10 Check and adjustment of phase of mechanism

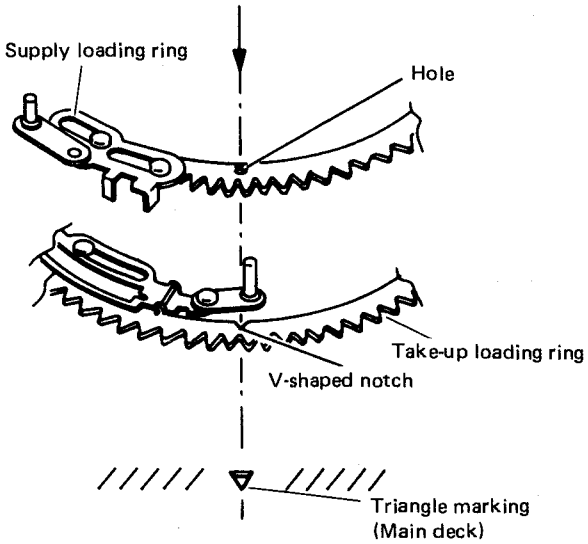


Fig. 1-6-14 Phase of loading rings

1. Loading ring

1) In the condition that the worm gear (inside the loading motor bracket ass'y) has been removed, turn the take-up and supply loading rings in the Unloading direction.
2) Assemble the take-up loading ring and supply loading ring so that the hole of the supply loading ring and the V-shaped notch of the take-up loading ring are aligned in the straight line toward the triangle mark of the main deck as shown in Fig. 1-6-14.

Reference: Correlative position of the pole base ass'y and ▲ mark of the guide rail

In the Stop mode, move the supply guide roller and take-up guide roller close to each other by fingers (this applies to back-lash adjustment of the rings). At this time, confirm that an edge of the pole base overlaps on ▲ mark even if it is a little.

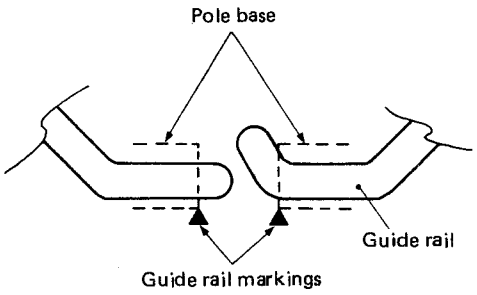


Fig. 1-6-15 Correlative position of guide rail and pole base

2. Middle pole

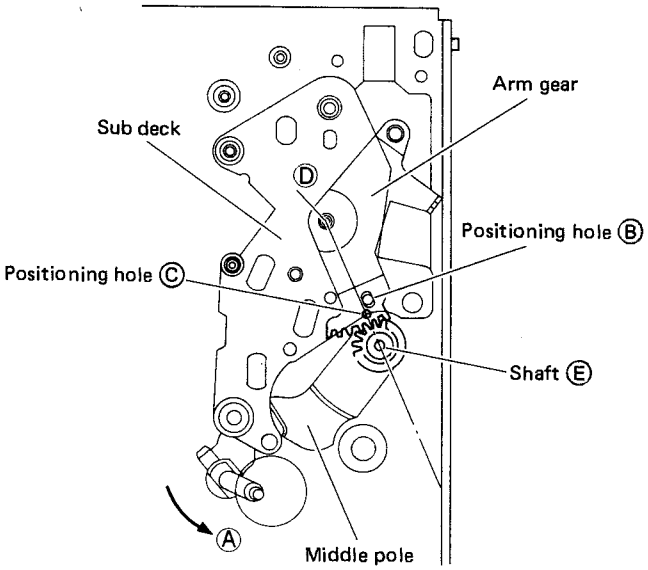


Fig. 1-6-16 Phase adjustment of middle pole

1) Move the middle pole in the direction of the arrow Ⓐ.
2) Align the arm gear's shaft Ⓓ, positioning hole Ⓒ and middle pole's shaft Ⓔ in the straighe line to set the arm gear.

3. Control cam

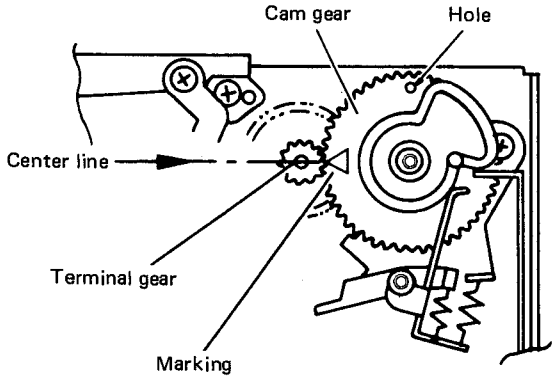


Fig. 1-6-17 Phase adjustment of control cam

1) Set the control cam (gear) as its marking faces toward the center of the terminal gear's shaft as shown in Fig. 1-6-17.

4. Mode control switch

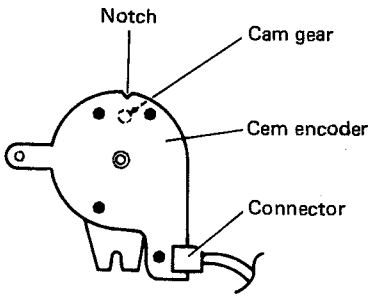


Fig. 1-6-18 Phase adjustment of mode control switch

1) In the Stop mode, the mode control switch has such the positional relation with others as shown in Fig. 1-6-18.

1.7 MAINTENANCE AND INSPECTION

Since this model is equipped with rotary parts and consumptive parts which wear away as time passes, it is important to clean the tape transport system and rotary parts as well as to apply oil and grease to them in order to make full use of its real capacity for a long time.

Besides such the simple maintenance work, it needs to replace wearing parts periodically.

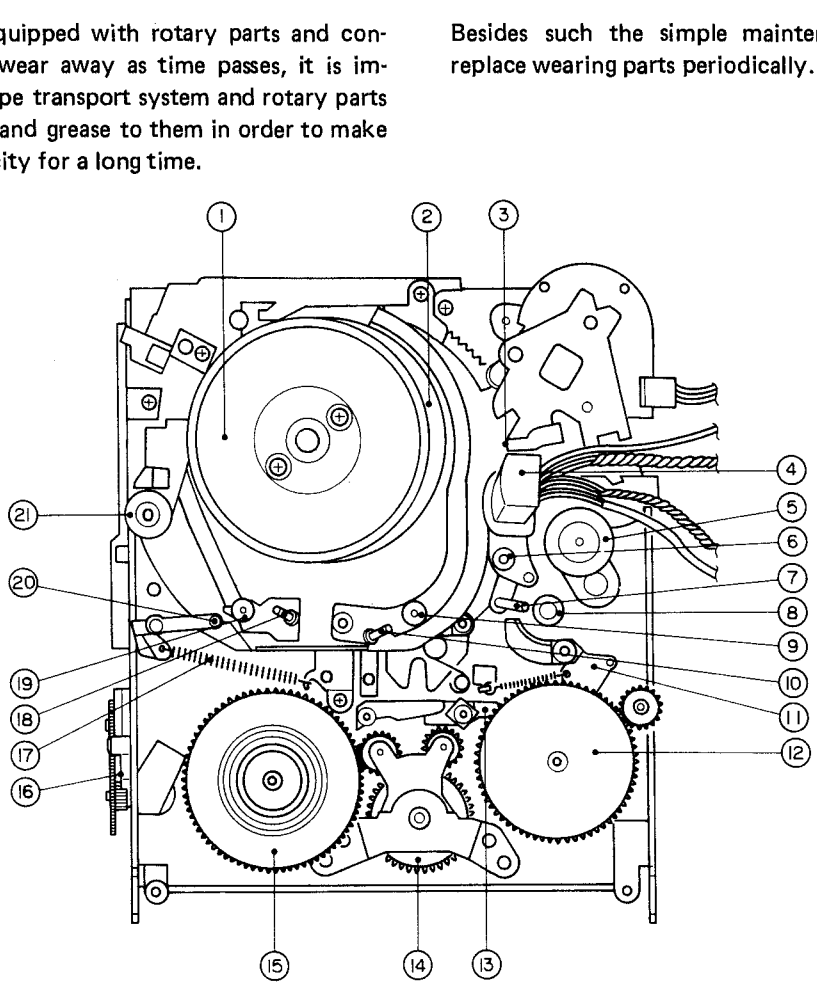


Fig. 1-7-1 Location of main mechanism parts (Top view)

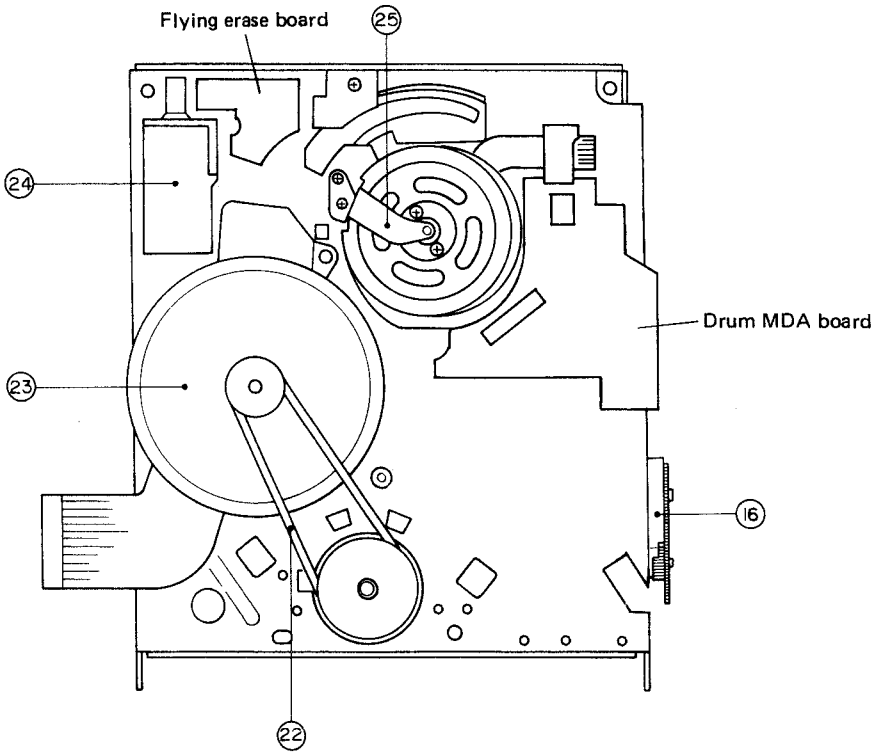


Fig. 1-7-2 Location of main mechanism parts (Bottom view)

1.7.1 Standard servicing schedule for main components

The following table indicates the standard servicing period by kind of servicing such as cleaning, oiling, replacing, etc. In practice, the indicated periods will widely vary according to environmental and using conditions, but it is plain that nonfulfillment of the maintenance work not only shortens the specific period of every item sharply but also influences other components badly.

Also be aware that rubber parts may possibly deform and age as time passes even when the set is not used.

System	Symbol No.	Parts Name	Ass'y	Periodic servicing schedule (operation hours)								
				250	500	750	1000	1250	1500	1750	2000	3000
Tape transport system	21	Impedance roller		★	★	★	★	★	★	★	★	★
	18	SUP slant pole	a									
	19	SUP guide roller	a									
	20	Tension pole	a									
	7	Middle pole	a									
	6	TU guide pole A	a									
	3	TU guide pole B	a									
	9	TU guide roller	a									
	10	TU slant pole	a									
	8	Capstan	a									
	2	Lower drum	a									
	1	Upper drum	a	★	★	☆	●	★	★	☆	●	●
	4	A/C head	a	★	★	★	★	★	★	★	★	●
	5	Pinch roller	a	★	★	★	★	★	★	★	★	●
Drive system	23	Capstan motor	a								●	
	22	Belt					○				●	○
	24	Mode control motor										●
	12	TU clutch gear	a	△	△	△	▲	△	△	△	▲	▲
	15	SUP reel disk	a	△	△	△	▲	△	△	△	▲	▲
	14	Center pulley	a				○				○	○
	13	Search brake lever		★	☆	★	☆	★	☆	★	☆	☆
	11	TU brake lever		★	★	★	☆	★	★	★	☆	☆
Others	16	Damper					○				○	●
	17	Tension band	a				○				○	○
	25	Brush					○				○	○

★ : Cleaning
☆ : Cleaning (or Replacement if necessary)
△ : Lubrication
a : Will be provided as assembly parts for replacement.
▲ : Lubrication (or Replacement if necessary)
● : Replacement
○ : Inspection, and Replacement if necessary

Table 1-7-1 Maintenance and inspection schedule

1.7.2 Remarks

1. Cleaning

1) For cleaning of the upper drum (particularly video heads) use fine-woven cotton cloth or Kimwipe which alcohol soaks through. Regarding cleaning manner, do not move the cloth but turn the upper drum counterclockwise.
   Note: Make sure not to move the cloth in the vertical direction to the video head, since it causes damage of the video heads.
2) For cleaning of parts of the tape transport system except the upper drum, use fine-woven cotton cloth or cotton swab in which alcohol soaks.
3) For cleaning of the search brake lever and take-up brake lever, take off the take-up clutch gear first, and then clean them with cotton swab soaked with alcohol.
4) Before loading the deck with cassette tape, confirm that the cleaned parts are completely dry.

2. Applying oil and grease

1) For parts and points to apply oil and grease, refer to the exploded views of the mechanism assembly.
   Table 1-7-2 specifies oil and grease to be used.
2) When oiling, clean the objective parts first and then apply one or two drop(s) of oil. Too much oiling causes rotary parts to slip because of oil leakage.

Classification	Name	Parts No.	Symbol in drawing
Grease	Moriton Grease No. 1	MOS2-C	A
Oil	Cosmo Hydro HV100	YTU94027	B

Table 1-7-2 Specific oil and grease used in the set

3. Checkup

After replacement of the supply reel disk and tension band, make sure to inspect and adjust back tension according to the adjustment procedure of the deck section.

4. Replacement

For replacement parts which are supplied as assembly parts, they are indicated by "a" in the "Ass'y" column of the Table 1-7-1.
For their parts numbers, refer to the parts list of the mechanism assembly parts.

SECTION 2
DECK SECTION ADJUSTMENT

2.1 PREPARATION

2.1.1 Precaution

In most cases the deck section is in need of electrical adjustment, it results from replacement of worn mechanical parts or video heads.
In the event of malfunction with electrical circuits, troubleshooting with the aid of proper test instruments must be done first, and then commence necessary repair, replacement and adjustment, etc.
At field servicing without a complete range of test instruments, avoid unnecessary disturbance of the internal control settings. For satisfactory repair and adjustment, send back the unit to the factory or the nearest authorized service center.
If field servicing is performed for unavoidable reasons, do it with care of the following things.

1. When loading the deck with a VHS-C cassette, make sure to remove the cassette door beforehand since it contacts with the drum if it is assembled.
2. In case of wiring to chip test points for measurement and observation, use IC clips, etc. to avoid any stress.

2.1.2 Standard setup

Disassemble the deck section from the main body referring to the description of Disassembly of Deck Section (Sect. 1.6.3), and set up the units and test instruments in the connection shown in Fig. 2-1-1.

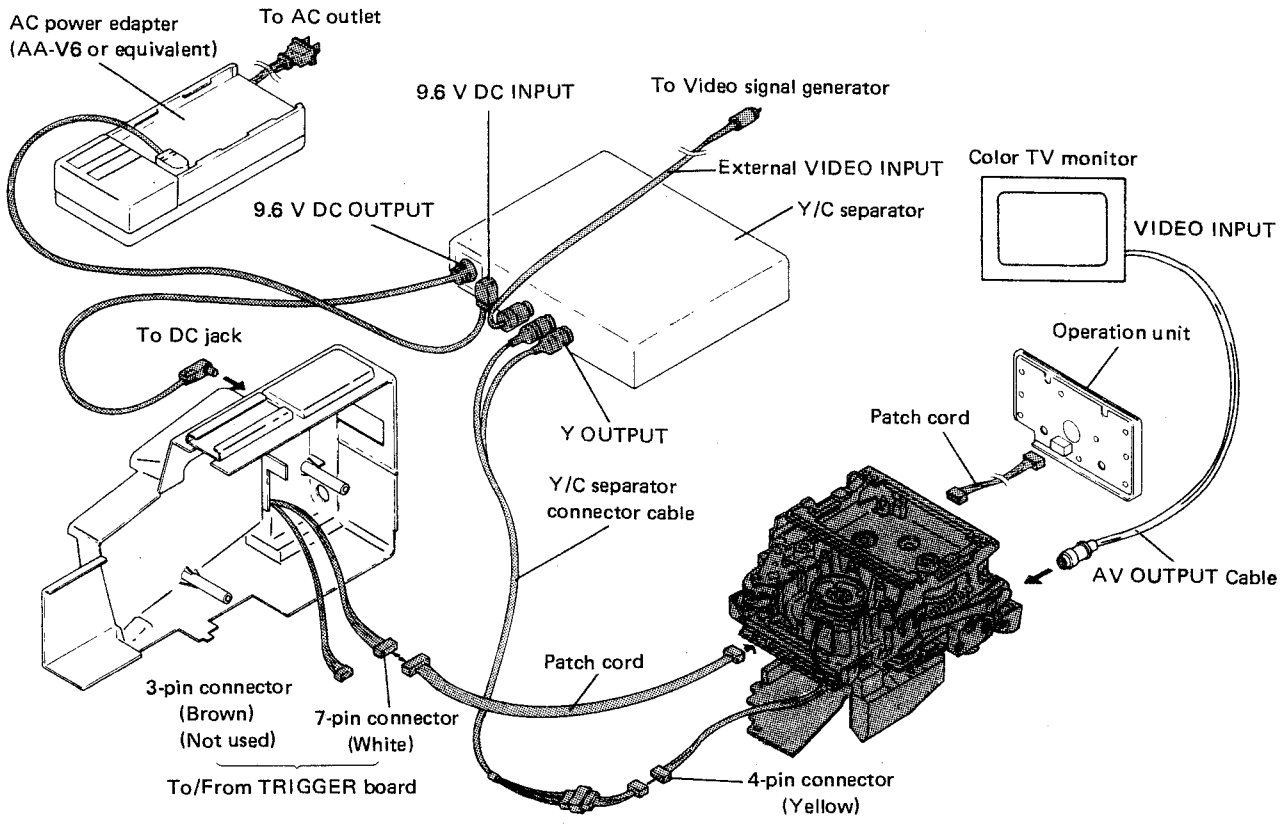


Fig. 2-1-1 Standard setup for deck section adjustment

2.2 REGULATOR CIRCUIT ([0][1] MAIN board)

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	REG 8 V	• SP REC	• TP3 (REG 8 V OUT) [0][1] MAIN	• R4 (REG 8 V) [0][1] MAIN	1) Connect a DC voltmeter between TP3 and TP5 (GND), and adjust R4 so that the voltmeter reads 8 ± 0.2 V DC.

2.3 SERVO CIRCUIT & INTERCHANGEABILITY

Note: Perform this adjustment after replacement of the drum ass'y and the upper drum.

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	Back tension	• Cassette torque meter • SP REC	• Cassette torque meter	• Screw Ⓐ	1) Set a cassette torque meter onto the deck in SP REC mode, and adjust the screw Ⓐ so that back tension is 15—20 gr-cm. At the same time, confirm that TU torque is 20—35 gr-cm. 2) Set the beginning portion of a TC-20 tape in SP REC mode. At that time, confirm that the shaft centers of the tension pole and the impedance roller are aligned on a vertical straight line on the front of the deck. **Note:** • Confirm that the tension pole does not contact the chassis at the beginning of the tape and the impedance roller rotates at the end of the tape. • If both results of the steps 1) and 2) are unsatisfactory, replace the tension band. • If there is a big difference in the value measured by the cassette torque meter, replace the supply reel disk. • If TU torque is out of the specified value, replace the TU clutch gear.
2	Tape pattern	• MH-C1 Stairstep	• TP7 (PB FM OUT) [0][2] Y/C • TP111 (DRUM FF) (External trigger) [0][1] MAIN	• SUP & TU guide rollers	1) Observe waveform at TP7 with external trigger (—) from TP111. 2) Playing back the MH-C1 tape, adjust the TRACKING control to maximize FM waveform. 3) If the FM waveform is not flat, adjust the supply and take-up guide rollers with a 1.5 mm hex. wrench to make the waveform flat. Note: To prevent the tape from damage, turn the guide rollers slowly and gently. 4) By turning the TRACKING control, vary the FM waveform output from maximum to minimum and vice versa gradually to confirm that FM waveform changes in a flat shape as a whole. 5) If the FM waveform breaks in the varying process, subtly adjust the height of guide roller(s) at every breaking so that the waveform varies as flat as possible. Repeat the steps 4) and 5) several times to confirm a flat waveform.

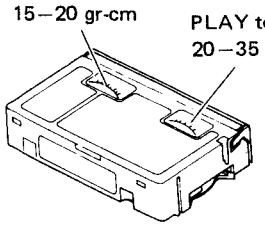


Fig. 2-3-1
Cassette torque meter

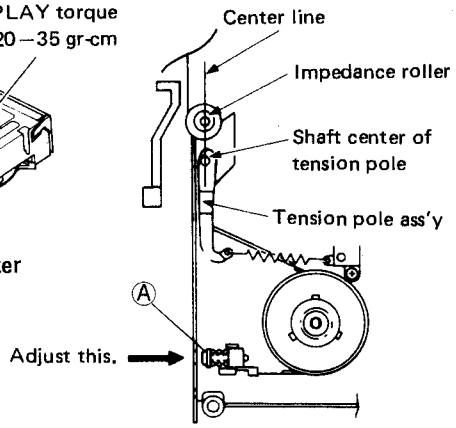


Fig. 2-3-2 Correlative position of tension pole and impedance roller

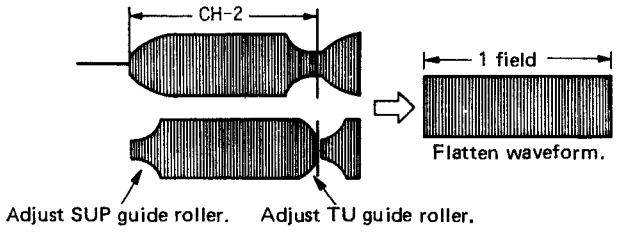


Fig. 2-3-3 FM waveform

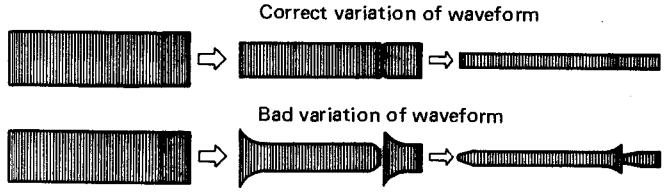


Fig. 2-3-4 FM waveform

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
		• REC then PB SP/EP			6) Since the position of the guide roller(s) may possibly change in the course of the adjustment, return the deck section into STOP mode once and then shift it to PB mode again to repeat the waveform confirmation. 7) Record the signal and play it back both in SP and EP modes to confirm that the waveform is flat. 8) In the above steps, make sure of no wrinkling/damage in the tape around the impedance roller and take-up guide pole in Loading/Unloading, Search Rewind, and at mode change from Search Rewind to Playback. If tape wrinkling or damage occurs around the take-up guide pole, adjust the angle (slant) of the A/C head to the tape so that the tape normally runs along the lower flange of the guide pole.
3	A/CTL head height & azimuth	• MH-C1 Audio 7 kHz (Stairstep)	• LINE OUT (A/V cable OUT)	• A/CTL head	1) Play back the stairstep signal (audio 7 kHz) and observe waveform at LINE OUT terminal. **Note:** If the output level is about −6 dBs (1.1 Vp-p), it is normal. 2) If necessary, slightly and evenly turn the screws Ⓐ (reference), Ⓑ (bent forward) and Ⓒ (azimuth) in the same direction (up to 45° each) to obtain the maximum output level. 3) For fine adjustment, use the screw Ⓑ to decrease the waveform fluctuation in level while use the screw Ⓒ to obtain the maximum output level.

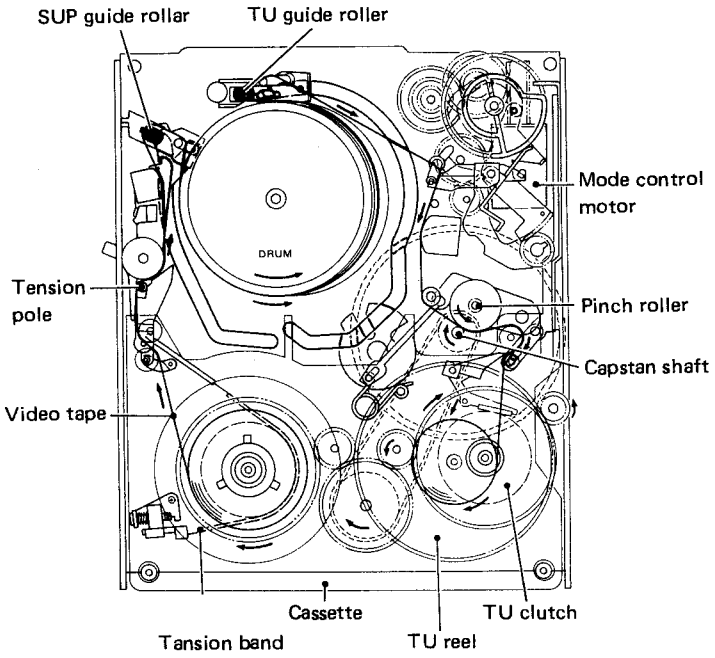


Fig. 2-3-5 Tape transport system

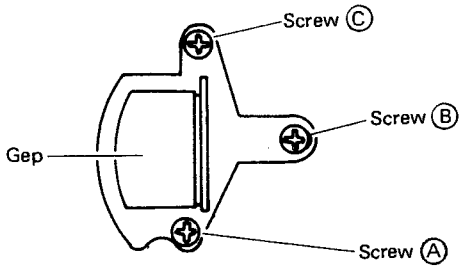


Fig. 2-3-6 A/C head

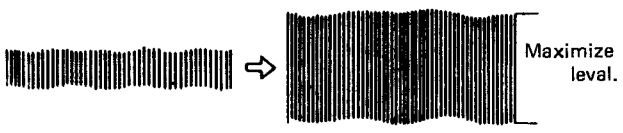


Fig. 2-3-7 Audio signal

<table>
<tr><th rowspan="2">No.</th><th rowspan="2">Item</th><th rowspan="2">Mode & Signal</th><th>Test Point</th><th>Adjustment Parts</th><th rowspan="2">Procedure</th></tr>
<tr><th colspan="2">Waveform & Adjustment</th></tr>
<tr><td>4</td><td>Tracking preset</td><td>• EP REC & PB
• TRACKING control: Center position</td><td>• TP108 (PB CTL PULSE OUT)
• TP111(DRUM FF) (External trigger)
[0] [1] MAIN</td><td>• R103 (TRACKING PRESET)
[0] [1] MAIN</td><td>1) Set the mode to EP REC.
2) Observe waveform at TP108 with external trigger (–) from TP111.
3) Record the signal and take note of the rise point of TP108's waveform.
4) Set the TRACKING control to the center position.
5) Play back the recorded section and adjust R103 so that the rise point of the recorded signal coincides with the peak of the positive pulse of the TP108's waveform.
5) Record the same signal and play it back in SP mode, and confirm that time lag between the positive pulse of TP108's waveform and the rise point of the recorded signal is within ±0.5 msec.</td></tr>
<tr><td>5</td><td>Phase of CTL head (X value)</td><td>• MH-C1 (Stairstep)
• TRACKING control: Center position</td><td>• TP7 (PB FM OUT)
[0] [2] Y/C
• TP111(DRUM FF) (External trigger)
[0] [1] MAIN</td><td>• CTL head</td><td>1) Observe waveform at TP7 with external trigger (+) from TP111.
2) Play stairstep portion of the MH-C1.
3) While turning the Tracking CTL, confirm the following matter.
When the Tracking CTL is center click position, FM level should be maximum.
When turning it to the left or right within about 10°, FM level maintain maximum, and when turning more than 10°, FM level starts to fall.
4) If item 3) is not satisfied, the adjustment must be performed.
Slightly loosen the screws Ⓓ and Ⓔ of the A/CTL (autio/control) head and draw the A/CTL head toward the capstan by hand.
5) Return the A/CTL head toward the drum little by little to find the point 'a–b' where FM output becomes maximum for the first time (for SP mode).
6) Subtly adjust phase of the A/CTL head and tighten the screws Ⓓ and Ⓔ at 'c' of the midpoint between 'a–b' (for EP).
7) Confirm step 3). If necessary, repeat step 3), 6).
8) Play the MHP-LC tape and confirm that FM output is almost maximum with the TRACKING-control set to the center position.
If not, repeat above steps.</td></tr>
</table>

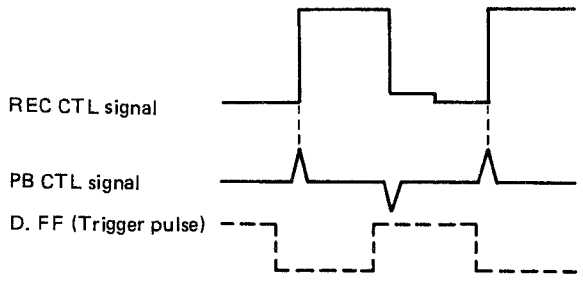


Fig. 2-3-8 Tracking preset

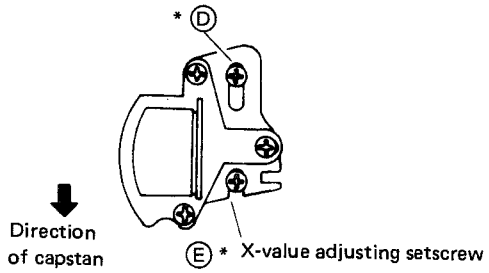


Fig. 2-3-9 CTL head phase

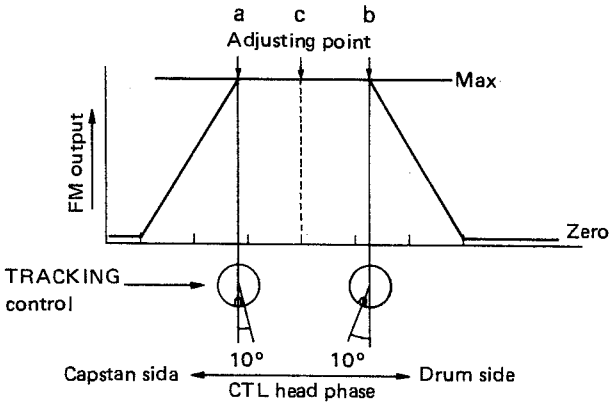


Fig. 2-3-10 CTL head phase adjusting point

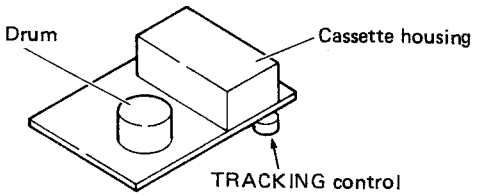


Fig. 2-3-11 Position of TRACKING control

No.	Item	Mode & Signal	Test Point	Adjustment Parts	Procedure
			Waveform & Adjustment		
6	PB switching point	• MH-C1 (Stairstep) • TRACKING control: Center position	• TPS (VIDEO OUT) [0][2] Y/C • TP111 (DRUM FF) (External trigger) [0][1] MAIN	• R10S (PB SW POINT) [0][1] MAIN	1) Observe waveform at TPS with external trigger (–) from TP111. 2) Adjust R10S so that trigger point is set 6.5H before the fall of V. sync. signal.
7	EP CTL head Phase fine adjustment	• MHP-LC PB • TRACKING control: Center position	• TP7 (PB FM OUT) [0][2] Y/C • TP111 (DRUM FF) (External trigger) [0][1] MAIN	• R106 (EP CTL DELAY) [0][1] MAIN	1) Adjust R106 to maximize PB FM signal level at TP7. 2) Turn the TRACKING VR and confirm that the PB FM signal level is maximum at its center position.

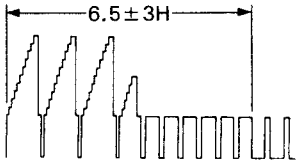


Fig. 2-3-12 PB switching point

2.4 Y/C CIRCUIT

2.4.1 Y (luminance) signal circuit

Note: • Before proceeding to do the following steps, check up whether each item is correctly adjusted or not.
• All test points and adjusting parts are located on the Y/C board.

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	E-E Y level	• Color bar input • E-E	• TP8 (VIDEO OUT) [0] [2] Y/C	• R161 (EE Y LEVEL) [0] [2] Y/C	1) Adjust R161 so that Y level at TP8 is 2.0 ± 0.2 Vp-p.
2	PB Y level	• MH-C1 Color bar	• TP8 (VIDEO OUT) [0] [2] Y/C	• R159 (PB Y LEVEL) [0] [2] Y/C	1) Adjust R159 so that Y level at TP8 is 2.0 ± 0.2 Vp-p.
3	YNR input level	• MH-C1 Color bar	• TP2 (DEMOD OUT) • TP3 (1H DL DEMOD OUT) [0] [2] Y/C	• R162 (1H DL DEMOD LEVEL) [0] [2] Y/C	1) Play back the color bar signal of the MH-C1 tape. 2) Connect CH-1 probe of a dual-trace oscilloscope to TP2 and its CH-2 probe to TP3, then, invert CH-2 and set the oscilloscope's BOLTS/DIV switch to the same range in the ADD mode. Adjust R162 so that levels of TP3 and TP2 are equal to each other, in other words, to minimize level difference.
4	White & Dark clip	• Color bar input • REC	• TP4 (MAIN EMPHASIS OUT) [0] [2] Y/C	• R157 (WHITE CLIP LEVEL) • R158 (DARK CLIP LEVEL) [0] [2] Y/C	1) Adjust R157 so that white clip becomes 90 ± 10% at TP4. 2) Adjust R158 so that dark clip becomes 50 ± 10% at TP4.

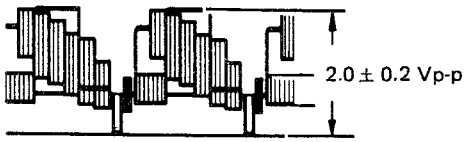


Fig. 2-4-1 E-E Y level

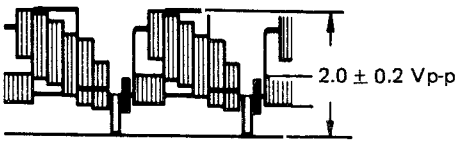


Fig. 2-4-2 PB Y level

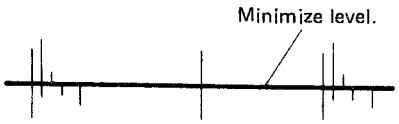


Fig. 2-4-3 YNR input level

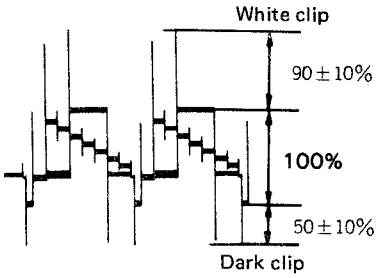


Fig. 2-4-4 White & dark clip

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
5	Carrier & deviation	• No input signal • REC	• TP1 (MOD OUT) 0 2 Y/C	• R156 (CARRIER) 0 2 Y/C	**Note:** This adjustment must be performed only in the case the E-E and playback systems are normal however sync is distorted (incorrect set of carrier) at playback of recorded signal, white section is jammed (incorrect deviation), and S/N ratio is extremely poor with small output level despite of 1.0 Vp-p input level. 1) Connect a frequency counter to TP1 and adjust R156 without input signal so that the counter reads 3.4 MHz ± 100 kHz. 2) Record the color bar signal and play it beck to confirms that Y level at TPB is 2.0 ± 0.2 Vp-p. 3) If necessary, adjust R155 in recording and confirm Y level in playback.
		• Color bar input • REC	• TP8 (VIDEO OUT) 0 2 Y/C	• R155 (DEVIATION) 0 2 Y/C	
6	REC FM level	• Color bar input • SP REC	• Test pin of pre-amp (CH-A REC FM OUT) 0 4 PREAMP • TP111 (DRUM FF) (External trigger) 0 1 MAIN	• R151 (REC FM LEVEL) 0 2 Y/C	1) Observe waveform at the HEAD terminal with external trigger (–) from TP111. 2) Adjust R151 to obtain 2.2 Vp-p as FM level of the pedestal portion.
7	Video EQ	• Color sweep • REC & PB	• TP8 (VIDEO OUT) 0 2 Y/C	• R152 (PB RF EQ) 0 2 Y/C	1) Connect the oscilloscope's probe to the VIDEO OUT terminal and play back the recorded sweep signal. 2) Referring to the 100 kHz marker (start signal) of the sweep signal as 4 scale divisions on the oscilloscope, adjust R152 so that the 2 MHz marker is 3.0 ± 0.3 scale divisions.

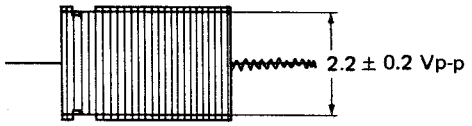


Fig. 2-4-5 REC FM level

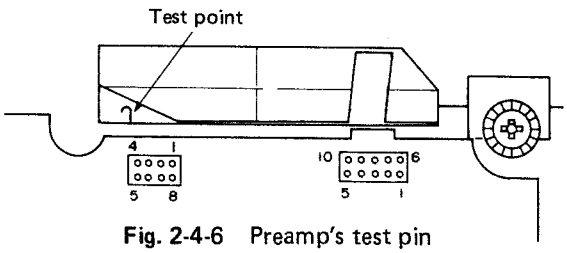


Fig. 2-4-6 Preamp's test pin

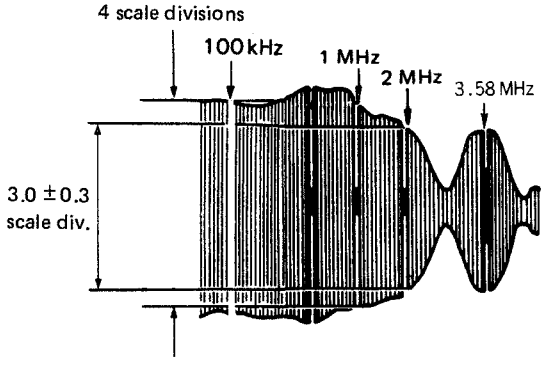


Fig. 2-4-7 PB RF equalizer

2.4.2 Color circuit

Note: • Before proceeding to do the following steps, check up whether each item is correctly adjusted or not.
• All test points and adjusting parts are located on the Y/C board.

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	E-E burst level	• E-E • Color bar input	• TP8 (VIDEO OUT) 0 2 Y/C	• R164 (E-E BURST LEVEL) 0 2 Y/C	1) Adjust R164 so that burst level at TP8 is 0.56 ± 0.06 Vp-p.
2	PB color level	• MH-C1 (Color bar)	• TP6 (PB ACC IN) 0 2 Y/C	• R163 (PB ACC INPUT LEVEL) 0 2 Y/C	1) Observe waveform at TP6 with external trigger (–) from pin 1 (SW A) of CN5 on the MAIN board. 2) Adjust R163 to obtain 60 mVp-p as the maximum level for the four heads.
3	REC color level	• Color bar input • REC & PB • SP	• TP6 (PB ACC IN) 0 2 Y/C	• R163 (REC COLOR LEVEL) 0 2 Y/C	1) Record the color bar signal and play it back in SP mode, and observe waveform at TP6 with external trigger (–) from pin 1 (SW A) of CN5 on the MAIN board. 2) Confirm that the highest channel level is 60 mVp-p. 3) If necessary, adjust R153 during recording and confirm the level in playback.
4	PB burst level	• Color bar input • REC & PB • SP	• TP8 (VIDEO OUT) 0 2 Y/C	• R154 (PB BURST LEVEL) 0 2 Y/C	1) Record the color bar signal and play it back in SP mode, and adjust R154 so that the burst level is 0.56 Vp-p at TP8.

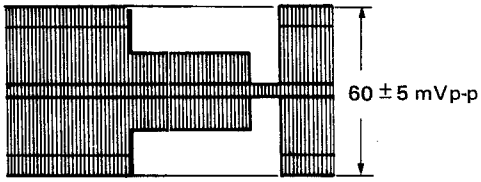


Fig. 2-4-8 PB ACC input level

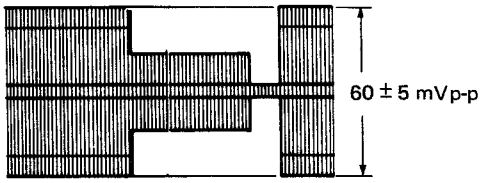


Fig. 2-4-9 REC color level

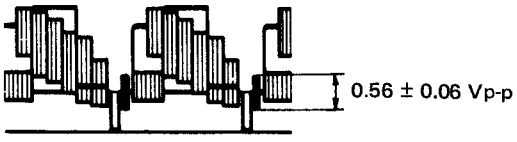
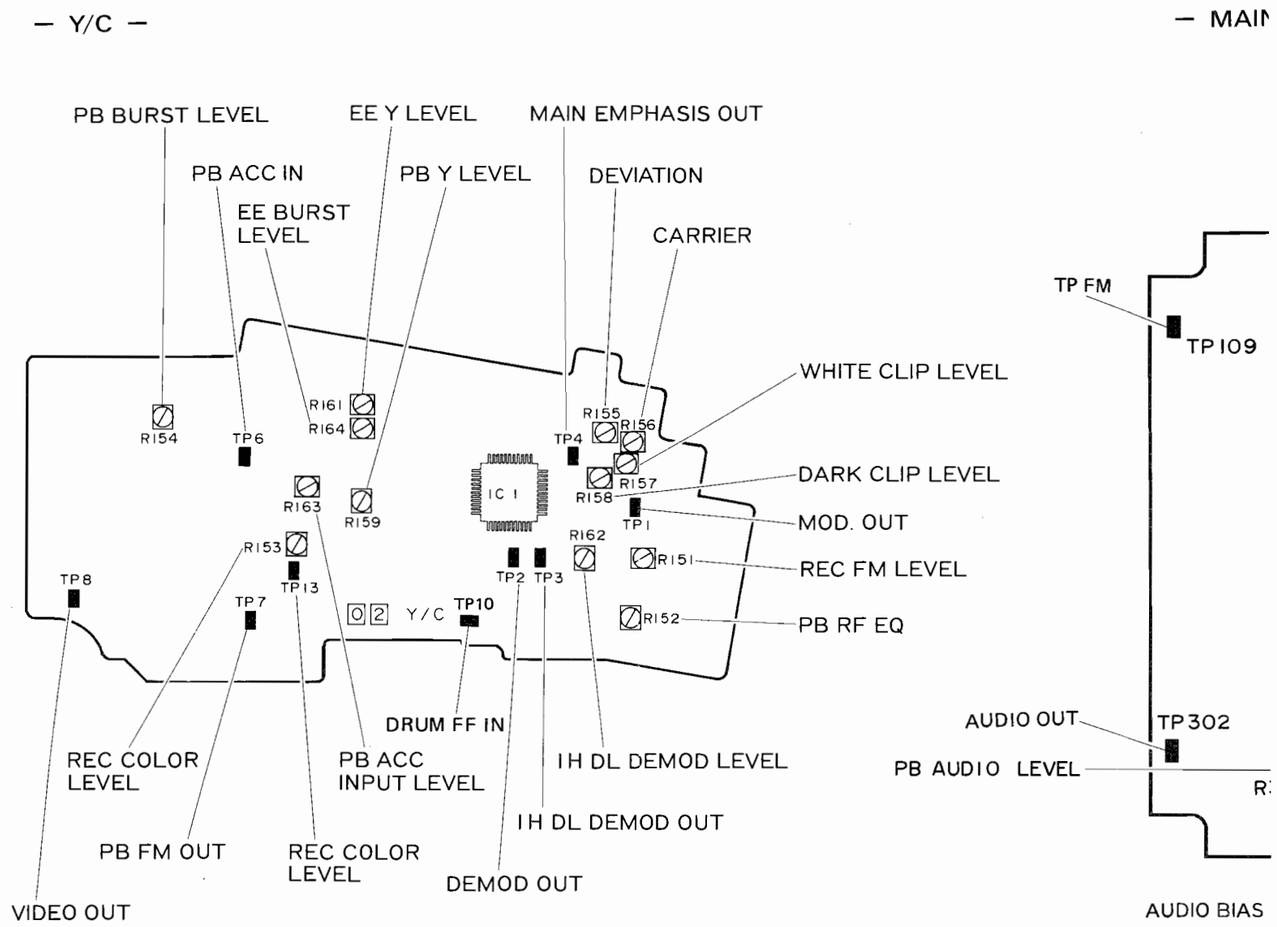


Fig. 2-4-10 PB burst level

2.4.3 Audio circuit

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	Bias level	• No signal input • REC	• TP303 (REC BIAS [+]) • TP304 (REC BIAS [−]) 0 1 MAIN	• R342 (AUDIO BIAS LEVEL) 0 1 MAIN	1) Connect an audio tester between TP303 and TP304, and adjust R342 so that the tester reads 2.2 mV rms in the Normal audio mode.
2	PB audio level	• MH-C1 (Color bar 1 kHz) • PB	• AUDIO OUT	• R309 (PB AUDIO LEVEL) 0 1 MAIN	1) Connect an audio tester to the AUDIO OUT terminal, and adjust R309 so that the tester reads −6 dBs.

■ **LOCATION OF TEST POINTS AND VRs on the MAIN and Y/C boards**



■, ◉ : Test points which are handy to hook up oscilloscope's probe.

2-9

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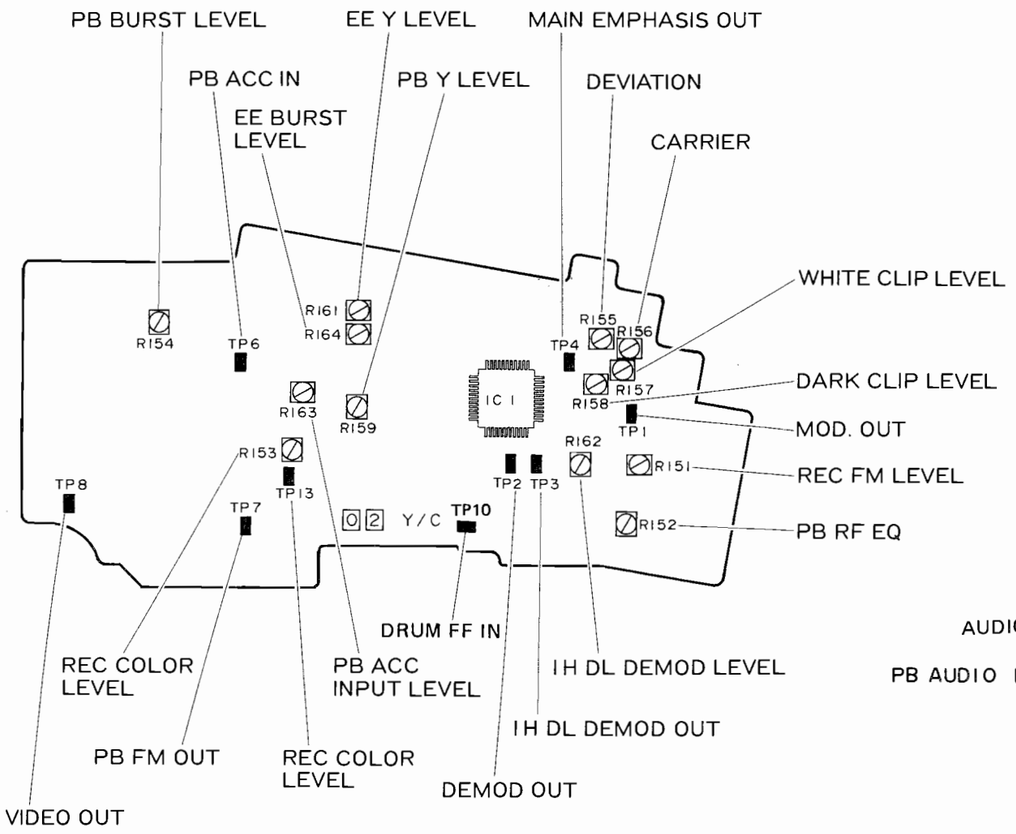
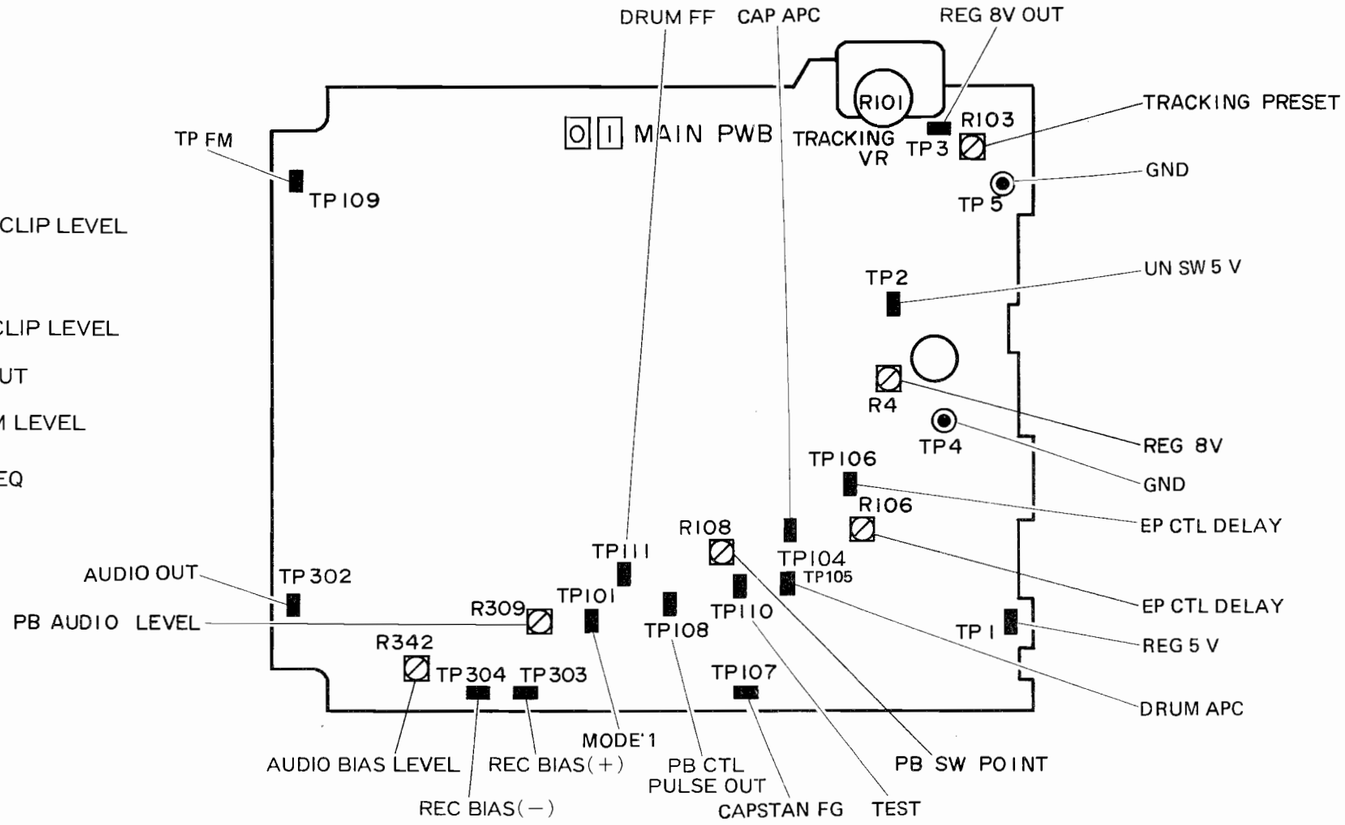
■ **LOCATION OF TEST POINTS AND VRs on the MAIN and Y/C boards**

— Y/C —



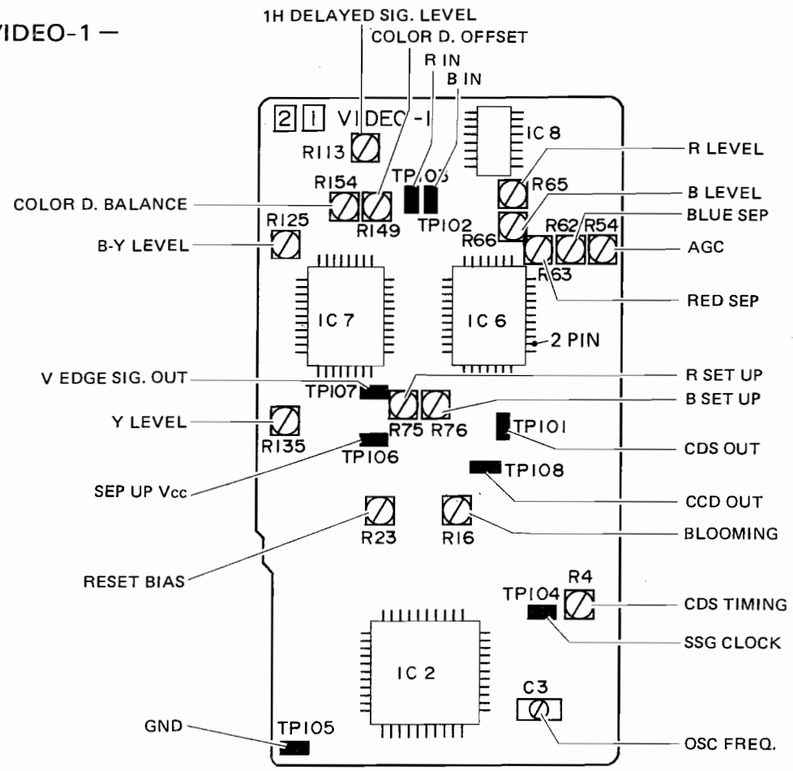
— MAIN —



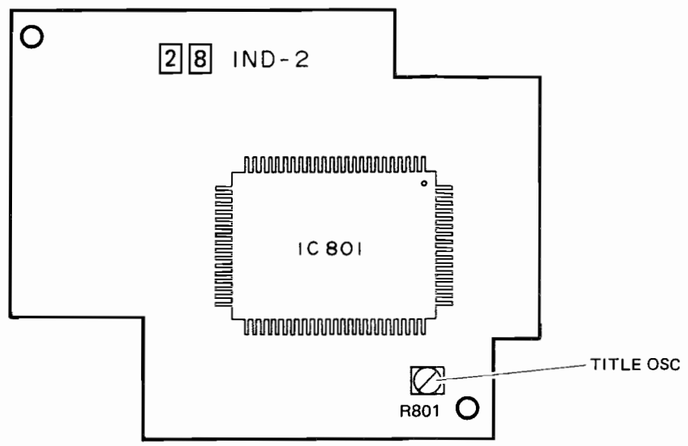
■, ◉ : Test points which are handy to hook up oscilloscope's probe.

• LOCATION OF TEST POINTS AND VRs ON THE CAMERA SECTION'S BOARDS

— VIDEO-1 —

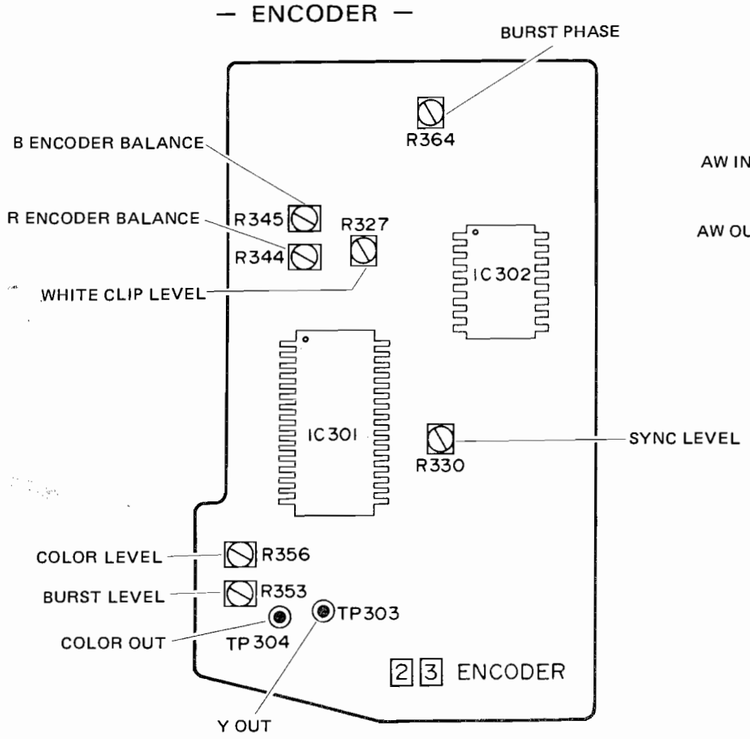


— IND-2 —

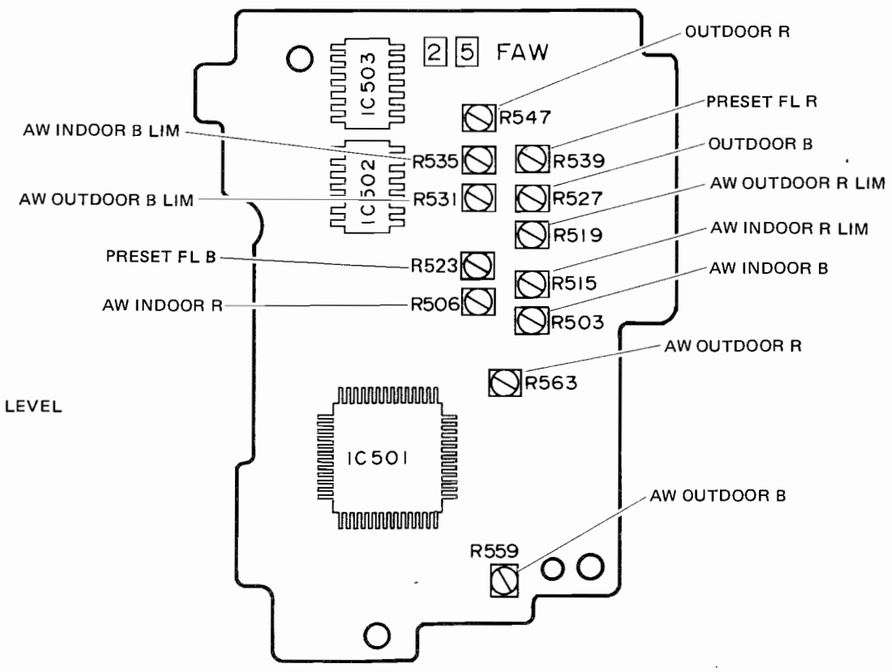


(■) : Test point for easy hookup with oscilloscope probe

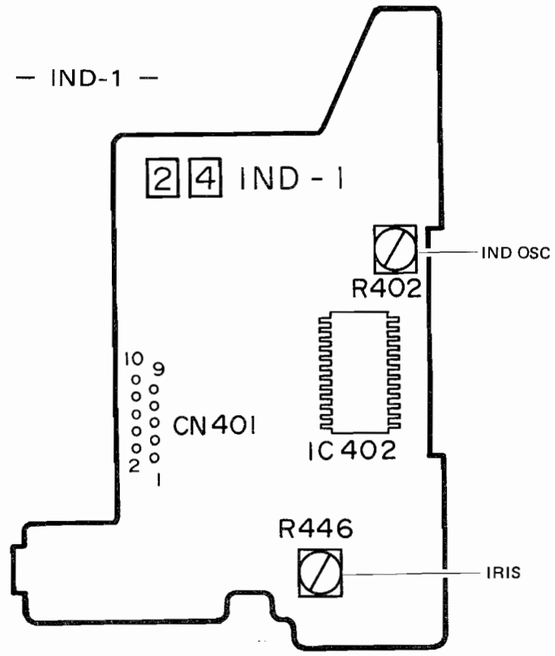
— ENCODER —



— FAW —



— IND-1 —



SECTION 3
CAMERA SECTION ADJUSTMENT

3.1 PREPARATION

3.1.1 Precautions

1. Make sure to use 2 or more lighting fixtures (3200 K in color temperature) and to light up the test pattern with them at 1200 lux or more brightly.
2. Use clean test pattern and camera filters.
3. All adjustments must be performed in a room that shuts out other light than the specific illumination.
4. For adjustments, set the controls to the following positions unless otherwise specified:
   Rehearsal;
   White Balance : PRESET INDOOR
   Focus : MANUAL
   Shutter Speed : STANDARD (STD)

3.1.2 Connections for adjustment

- For disassembly of the camera section, refer to Sec. 1.5 "DISASSEMBLY OF CAMERA SECTION".

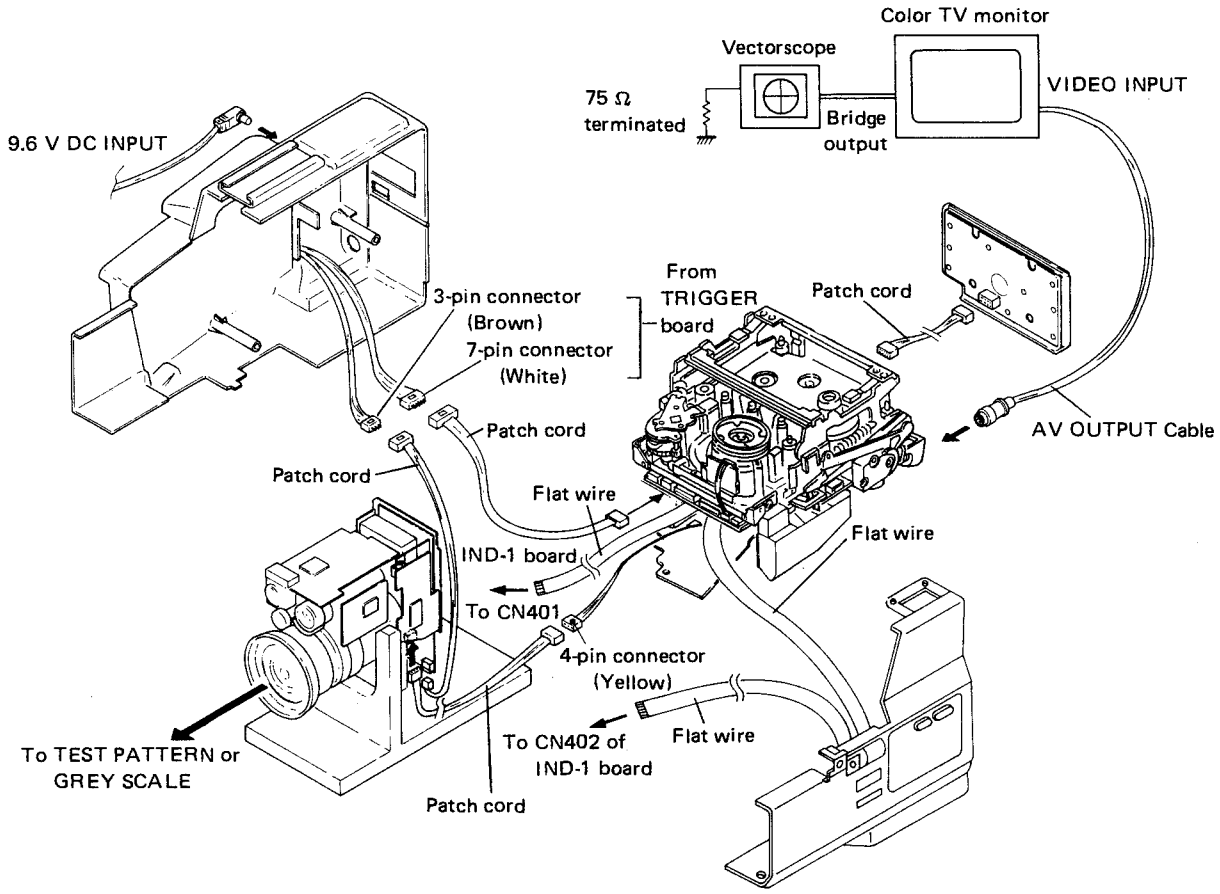
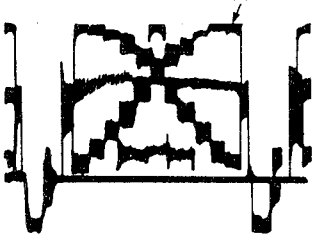
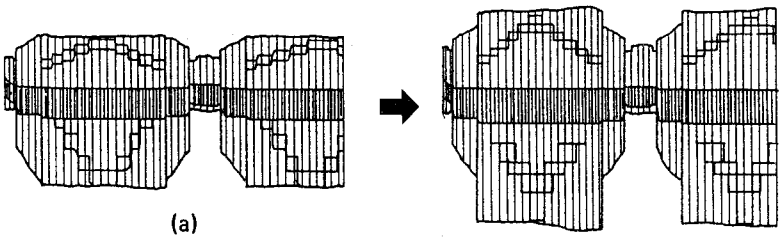
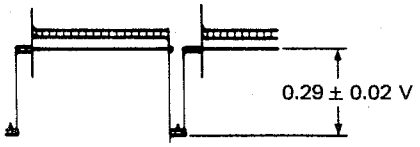
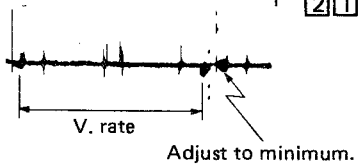


Fig. 3-1-1 Connections for adjustment

3.2 Y (LUMINANCE) SIGNAL SYSTEM

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	CCD Drive frequency		• TP104 (SSG CLOCK) 2 1 VIDEO-1	• C3 (OSC FREQ.) 2 1 VIDEO-1	1) Connect a frequency counter to TP104, and adjust C3 for 12.713285 MHz (808 x Fh) ± 80 Hz.
2	Rest bias	• Gray scale	• TP303 (Y OUT) 2 3 ENCODER		1) Connect the oscilloscope to TP303 and pick up the gray scale. 2) Turn the zoom ring so that the upper three steps are clipped on the oscilloscope.
			Clip upper 3 steps  Fig. 3-2-1 White clip		
			• TP108 (CCD OUT) 2 1 VIDEO-1	• R23 (RESET BIAS) 2 1 VIDEO-1	3) Change the oscilloscope to TP108. 4) Turn R23 for minimum level at TP108. 5) Adjust R23 slowly to higher level and stop R23 in a moment the maximum level is obtained.
			 (a) (b) Fig. 3-2-2 CCD output		
3	Sync level	• Lens closed	• TP303 (Y OUT) 2 3 ENCODER	• R330 (SYNC LEVEL) 2 3 ENCODER	1) Close the lens with the cap. 2) Adjust R330 so that sync level at TP303 becomes 0.29 V.
			 Fig. 3-2-3 Sync level		
4	Vertical enhancer balance	• Gray scale	• TP107 (V. EDEG SIG OUT) 2 1 VIDEO-1	• R113 (1H DELAYED SIGNAL LEVEL) 2 1 VIDEO-1	1) Pick up the gray scale and observe waveform at TP107. 2) Adjust R113 to minimize average level of the waveform.
			 Fig. 3-2-4 V. edge		

No.	Item	Mode & Signal	Test Point	Adjustment Parts	Procedure
			Waveform & Adjustment		
5	Iris and Y level	• Gray scale	• TP101 (CDS OUT) 2 1 VIDEO-1	• R446 (IRIS) 2 4 IND-1	1) Pick up the gray scale and observe waveform at TP101 via 10 kΩ resistance. 2) Adjust R446 to obtain 0.2 Vp-p as the video signal level. 3) Connect the oscilloscope to TP303 and adjust R135 for 0.7 Vp-p as the video signal level.
6	White clip level	• Gray scale	• TP303 (Y OUT) 2 3 ENCODER	• R327 (WHITE CLIP LEVEL) 2 3 ENCODER	1) Pick up the gray scale and observe waveform at TP303. 2) Turn the zoom ring so that the white peak portion is cliped on the oscilloscope screen. 3) Adjust R327 so that white clip level is 0.78 V.
7	AGC	• Lens closed	• IC6 pin 2 2 1 VIDEO-1	• R54 (AGC) 2 1 VIDEO-1	1) Close the lens with the cap. 2) Adjust R54 for 1.1 ± 0.1 V DC at pin 2 of IC6.
8	Blooming		• TV monitor	• R16 (BLOOMING) 2 1 VIDEO-1	1) Pick up a fluorescent light and adjust R16 to minimize blooming. **Note:** No matter how further R16 is turned, there will be no change in blooming observed on the monitor. Therefore, set R16 to a position where blooming becomes minimum for the first time and won't change any more even if R16 is turned further.
9	Indicator	• Lens closed • Manual focusing	• E. VF	• R402 (IND OSC) 2 4 IND-1	1) Turn the focus lens subtly until the "Correct focus" indication appears in the electronic viewfinder. 2) Adjust R402 to position the "Correct focus" indication in the center of the viewfinder screen.

Fig. 3-2-5 IRIS

Fig. 3-2-6 Y level

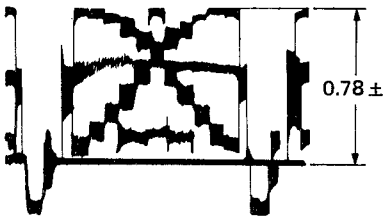


Fig. 3-2-7 White clip

3.3 COLOR SIGNAL SYSTEM

3.3.1 Basic indoor mode

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts	Procedure
1	R/B separation	• Color bar	• TP103 (R IN) • TP102 (B IN) 2 1 VIDEO-1 • TP303 (Y OUT) (Ext. trigger) 2 3 ENCODER	• R63 (RED SEP) • R62 (BLUE SEP) 2 1 VIDEO-1	1) Connect the oscilloscope to TP103. 2) In the condition that TP303 is swept with external trigger and the oscilloscope is set to HOLD OFF mode, observe the Blue line as shown in Fig. 3-3-1. 3) Adjust R63 to equalize levels of Yellow and Red. 4) Connect the oscilloscope to TP102. 5) Adjust R62 for the same purpose of the above steps 2) and 3).
2	Color difference offset	• Lens closed	• Vectorscope	• R149 (COLOR D. OFFSET) 2 1 VIDEO-1	1) Close the lens with the lens cap. 2) Adjust R149 so that dots meet with each other at the same point on the vectorscope.
3	Color difference balance	• Color bar • Just scan	• Vectorscope	• R154 (COLOR D. BALANCE) 2 1 VIDEO-1	1) Pick up the color bar pattern. 2) Adjust R154 so that RED dots meet with each other at the same point on the vectorscope.

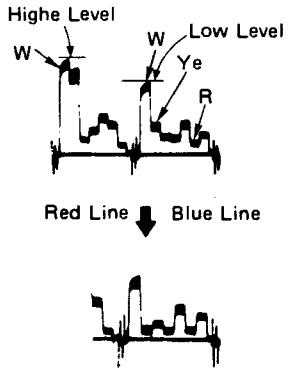


Fig. 3-3-1 R/B separation

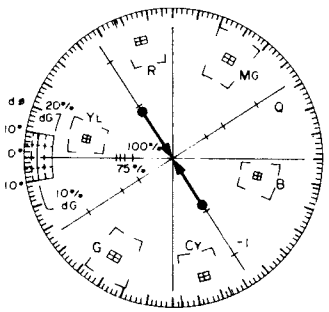


Fig. 3-3-2 Chroma offset

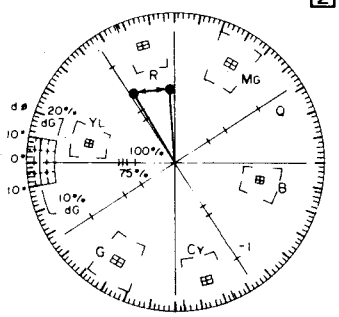
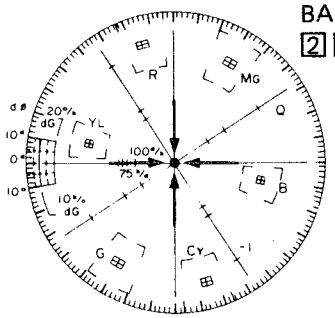
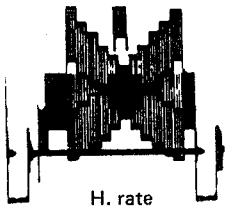
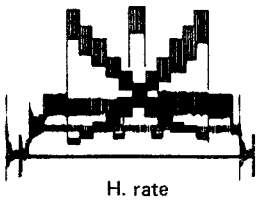
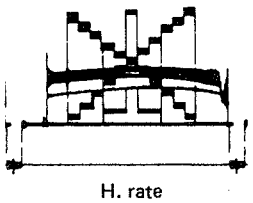


Fig. 3-3-3 C.difference balance

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts	Procedure
4	Encoder balance	• Lens closed • Jump wire	• Vectorscope	• R344 (R ENCODER BALANCE • R345 (B ENCODER BALANCE) 2 3 ENCODER	1) Close the lens with the lens cap, and short-circuit TP106 (SET UP VCC) to GND for zero set up level. 2) Adjust R344 and R345 to center every dot on the vectorscope altermately.
					
			Fig. 3-3-4 Carrier balance		
5	White balance	• Gray scale • Just scan	• TP8 (VIDEO OUT) 0 2 Y/C		1) Pick up the gray scale with just scan.
				• R76 (B SET UP) • R75 (R SET UP) 2 1 VIDEO-1	2) Adjust R76 and R75 alternately so that carrier leakage of low level becomes minimum.
			Fig. 3-3-5 White bal-1		
			(2)	• R66 (B GAIN) • R65 (R GAIN) 2 1 VIDEO-1	3) Adjust R66 and R65 alternately so that carrier leakage of white peak level becomes minimum. 4) Repeat steps 2) and 3) several times to minimize carrier leakage all over. **Note:** Confirm that dot is positioned at the center of the vectorscope to minimize the carrier leakage.
					
			Fig. 3-3-6 White bal-2		
			(3)		
					
			Fig. 3-3-7 White bal-3		

No.	Item	Mode & Signal	Test Point	Adjustment Parts	Procedure
			Waveform & Adjustment		
6	CD8 timing	• Gray scale • Iris open ND8 x 2 ND4 x 1 to be about 50 lux	• Vectorscope	• R4 (CDS TIMING) [2] [1] VIDEO-1	1) Pick up the gray scale. 2) Adjust R4 so that the dot centers on the vectorscope. 3) If necessary, readjust the above No. 5 (white balance).
7	Burst level	• Lens closed	• TP304 (COLOR OUT) [2] [3] ENCODER	• R353 (BURST LEVEL) [2] [2] ENCODER	1) Close the lens with the lens cap. 2) Connect the oscilloscope to TP304 and adjust R353 for 0.29 Vp-p as the burst level.
8	Burst phase	• Color bar	• Vectorscope	• R364 (BURST PHASE) [2] [3] ENCODER	1) Pick up the color bar pattern. 2) While observing the vector scope, adjust R364 so that phase of the red component is matched to the red phase direction on the vector scope.
9	Color level	• Color bar • Just scan	• Vectorscope	• R356 (COLOR LEVEL) [2] [3] ENCODER	1) Pick up the color bar pattern with just scan. 2) Adjust R356 so that red level becomes 110 ± 10% of burst level on the vector scope.

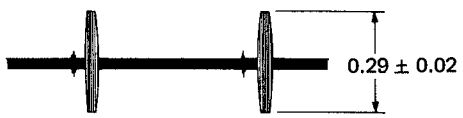


Fig. 3-3-8 Burst

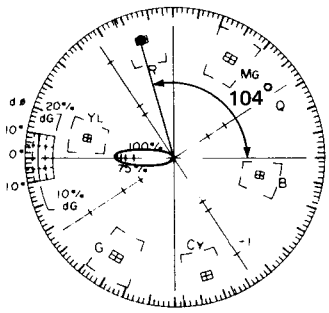


Fig. 3-3-9 Burst phase

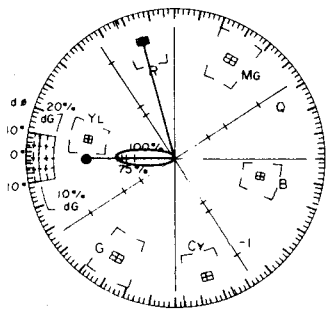


Fig. 3-3-10 Color level

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
10	Color phase	• Color bar	• Vectorscope	• R125 (B-Y GAIN) LEVEL) [2][1] VIDEO-1 • R364 (BURST PHASE) [2][3] ENCODER	1) Pick up the color bar pattern. 2) Adjust R125 so that the dot of every color respectively positions in the ⊞ mark direction being wellbalanced with each other. If necessary, perform fine-adjustment by readjusting R125 and R364 alternately.

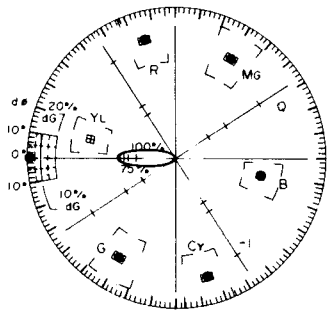


Fig. 3-3-11 Color phase

3.3.2 Preset FL (fluorescent) white balance

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	Preset FL	• Preset FL • Gray scale	• Vectorscope	• R539 (PRESET FL R) • R523 (PRESET FL B) [2][5] FAW	1) Pick up the gray scale. 2) Fix CS and CC10Y filters to the camera lens. 3) Adjust R539 and R523 so that every dot centers on the vectorscope.

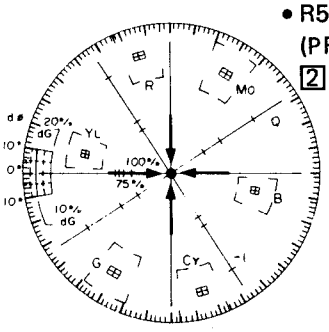


Fig. 3-3-12 Preset FL

3.3.3 Preset outdoor white balance

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	Preset OUTDOOR	• Preset OUTDOOR • Gray scale	• Vectorscope	• R527 (OUTDOOR B) • R547 (OUTDOOR R) 2 5 FAW	1) Fix C12 cold filter to the camera lens and pick up the gray scale. 2) Adjust R527 and R547 alternately to position all dots at the center of the vectorscope.

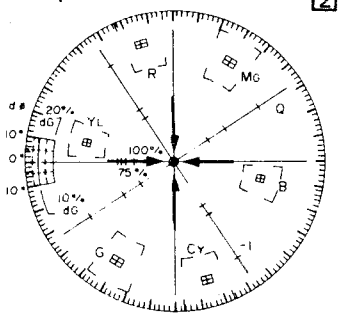


Fig. 3-3-13 Preset OUTDOOR

3.3.4 Automatic white balance

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	INDOOR Limiter /INDOOR Auto white	• Auto White • Gray scale	• Vectorscope	• R515 (AW INDOOR R LIM) • R535 (AW INDOOR B LIM) • R503 (AW INDOOR B) • R506 (AW INDOOR R) 2 5 FAW	1) Fix W4 filter to the camera lens, while W14 to the sensor, and pick up the gray scale. 2) Adjust R515 and R535 alternately to position all dots at the center of the vectorscope. 3) Remove the both filters, adjust R503 and R506 alternately for the same purpose of the above step 2). 4) Repeat steps 1) – 3).

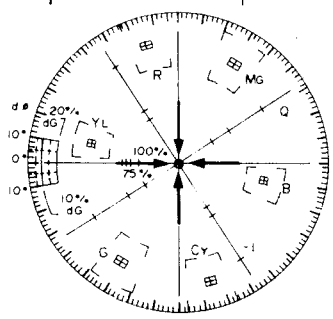


Fig. 3-3-14 Auto white INDOOR

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
2	OUTDOOR Limiter /OUTDOOR Auto White	• Auto White • Gray scale	• Vectorscope	• R519 (AW OUTDOOR R LIM) • R531 (AW OUTDOOR B LIM) • R559 (AW OUTDOOR B) • R563 (AW OUTDOOR R) 2 5 FAW	1) Fix C16 filter to the camera lens, while C24 to the sensor, and pick up the gray scale. 2) Adjust R519 and R531 alternately to position all dots at the center of the vectorscope. 3) Change C12 filter to the camera lens, while C14 filter to the sensor, and adjust R559 and R563 alternately for the same purpose of the above step 2). 4) Repeat steps 1) to 3).

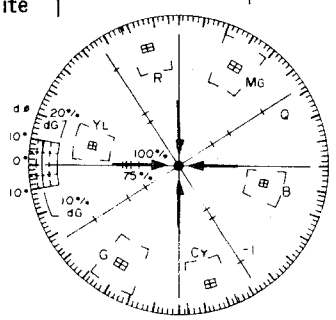


Fig. 3-3-15 Auto white OUTDOOR

3.4 TITLE POSITION

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
1	Title indication width	• Lens closed	• TV monitor • TP303 (Y OUT) [2] [3] ENCODER	• R801 (TITLE OSC) [2] [8] IND-2	1) Close the camera lens with the lens cap, and press the TITLE MEMORY button. 2) Take off the lens cap and pick up an optional camera subject. 3) Observe TP303's waveform at H-rate, and adjust R801 so that video scanning period and title signal coincide with each other.

3.5 AUTO FOCUS

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts	Procedure
1	Back focus	• Subject in the distance of 2 m or farther • Iris: Opened (with ND filter) • Manual focusing	• on TV monitor	• Master Lens	1) Attach a proper ND filter to the camera lens to open the iris fully in the daylight, and set the focus lens to " ∞ " position. 2) After the setscrew is loosened, slowly turn the ff adjusting screw to focus the lens observing the TV monitor. 3) Set the zoom lens to "68" focal distance and confirm that the subject is in focus. 4) Set the focus lens to "2 m" subject distance, and shoot a camera subject in the distance of 2 m. In this state, confirm that the image is in focus in two ways that the focal distance of the zoom lens is set to "68" and "8.5" positions. 5) Tighten the setscrew Ⓐ and lock the back focus adjusting screw.
2	AF (Auto Focus)	• Subject in the distance of 2 m • Focus SW: AUTO • Auto focus chart • Iris: Opened (with ND filter)	• on TV monitor	• AF Lens	• Prior to auto focus adjustment, confirm that back focus of the camera has been correctly adjusted. 1) Set up the auto focus adjustment chart and the camera so that the distance between the chart and the front lens is 2 m approx. 2) Shoot the chart (shown in Fig. 3-5-3) as it is lifted up by the left side to have a tilt at 20° to the horizon. 3) After loosening the screw Ⓐ under the AF unit (see Fig. 3-5-2), insert an eccentric driver into the AF lens hole. 4) Focus the camera on the chart by moving the AF lens with the eccentric driver to the front and the rear. 5) Tighten the screw Ⓐ.
		• Focus SW: MANUAL			6) Pick up the AF chart with manual mode and focus the main lens. Confirm that "correct focus" indication appears in the viewfinder. If necessary, readjust step 3) to 5).

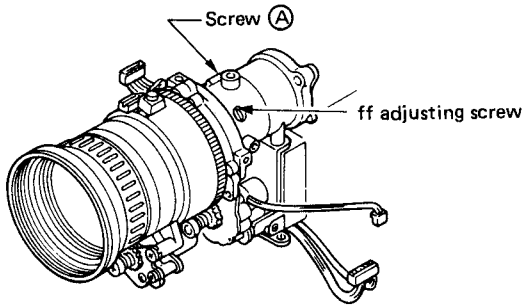


Fig. 3-5-1 Back focus

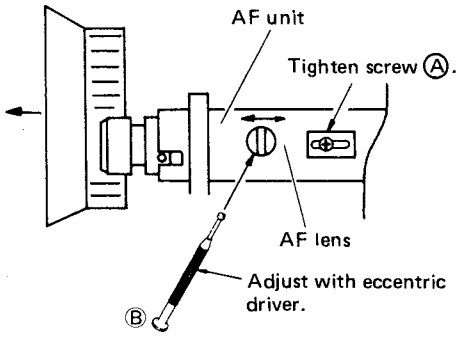


Fig. 3-5-2 AF adjusting point

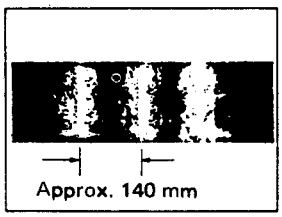


Fig. 3-5-3 AF chart

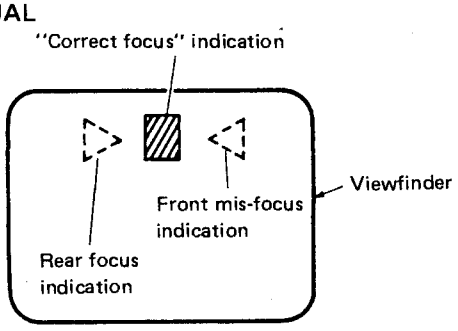


Fig. 3-5-4 Indicator position

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Waveform & Adjustment	Procedure
3	Focus bias	• Subject in the distance of 2 m • Focus SW: AUTO • AF chart • Iris: Opened (with ND filter)	• TV monitor • E. VF "Correct focus" indication	• VR4 (FOCUS BIAS) AF board	1) Pick up the AF chart with AUTO mode. 2) Turn the focus ring to telephoto. Confirm that autofocusing is correct. 3) Turn the focus ring to wide. Confirm that auto-focusing is correct. 4) If necessary, preform fine-adjustment by adjusting VR4 to satisfy 2) and 3).

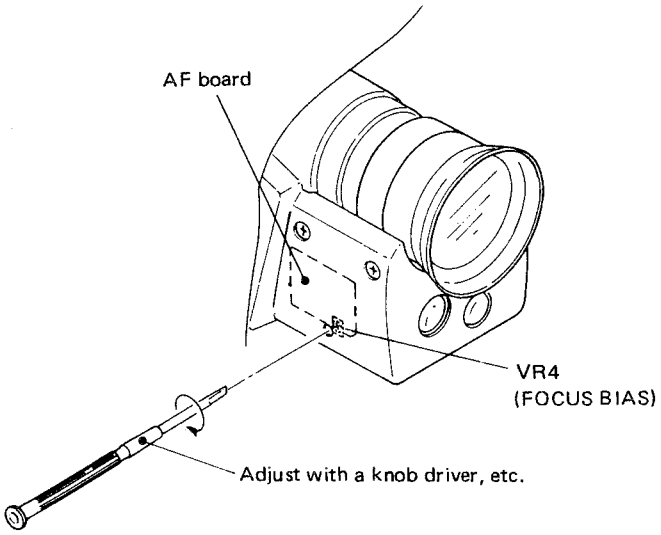


Fig. 3-5-5 Focus bias

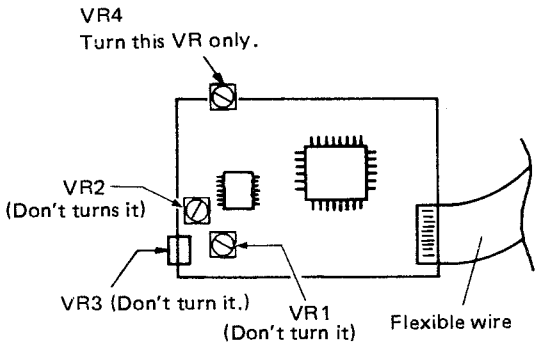
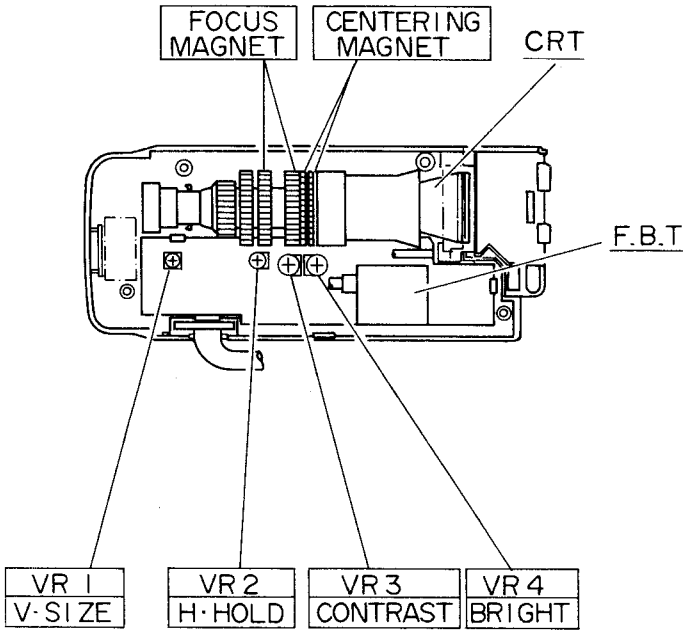


Fig. 3-5-6 Location of VRs

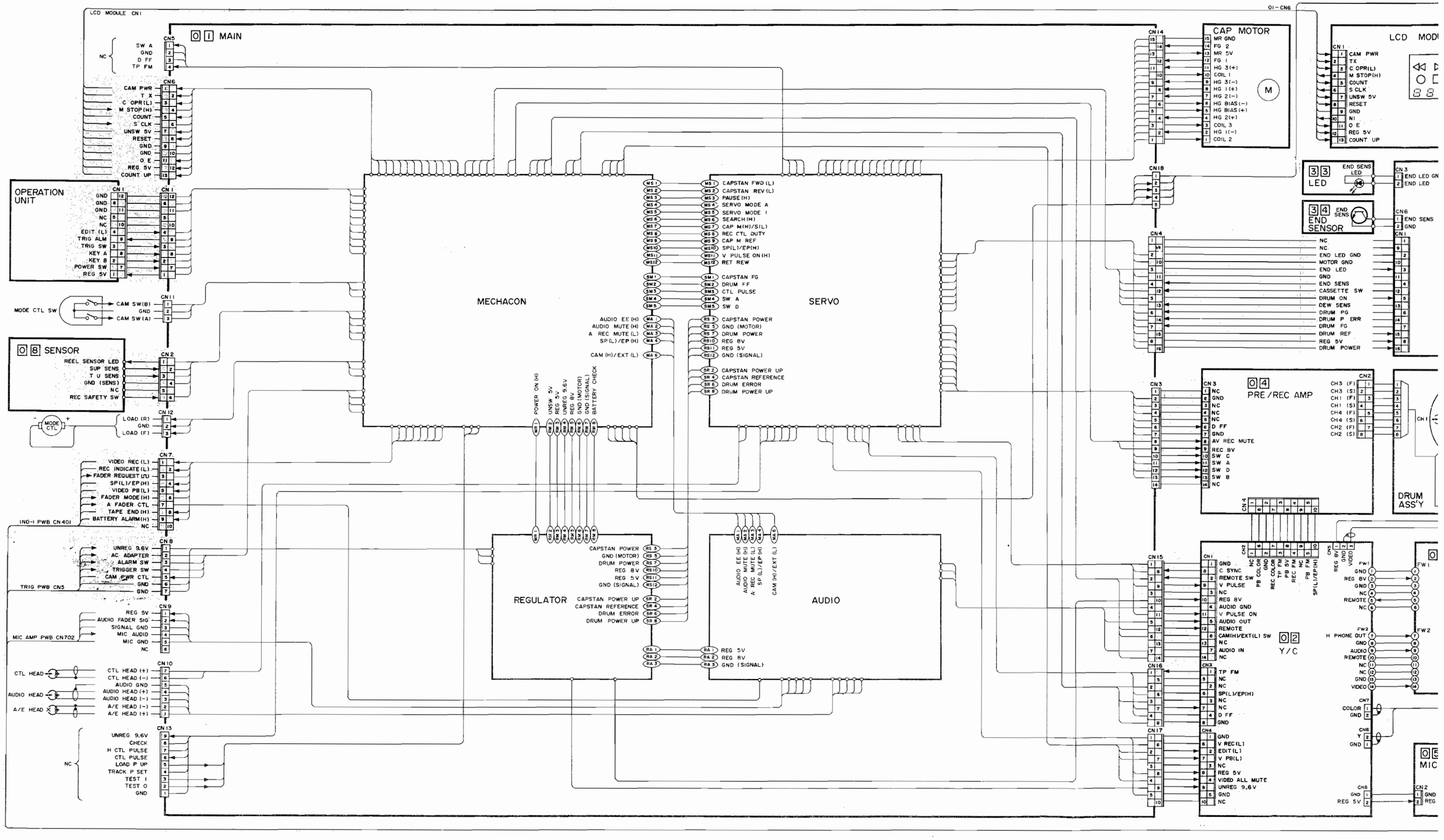
3.6 E. VF (ELECTRONIC VIEWFINDER)

No.	Item	Mode & Signal	Test Point / Waveform & Adjustment	Adjustment Parts / Adjustment	Procedure
1	Horizontal sync.	• MH-C1 Gray scale (PB)	• E. VF	• VR2 (H. HOLD) 5 0 VF board	1) Observing the viewfinder screen, turn VR2 full clockwise to make the picture unstable. 2) Gradually return VR2 counterclockwise until the picture becomes stable. Mark the VR position where the picture is completely stabilized. 3) Next, turn VR2 full counterclockwise to make the picture unstable similarly to the above step 1). 4) Gradually return VR2 clockwise until the picture becomes stable, and mark the position of VR2. 5) Set VR2 to the midpoint between the two markings in the steps 2) and 4). **Note:** It is the correct VR setting by which DC voltage at pin 12 of IC1 is 3.0 V.
2	Vertical scanning	• MH-C1 Gray scale PB	• E. VF	• VR1 (V. SIZE) 5 0 VF board	1) Observing the viewfinder, adjust VR1 for normal picture amplitude.
3	Centering	• MH-C1 Gray scale PB	• E. VF	• Centering Magnet	1) Adjust the centering magnet so that the gray scale image appears in the center of the viewfinder screen.
4	Focus	• MH-C1 Gray scale PB	• E. VF	• Focus Magnet	1) Observing the viewfinder, adjust the focus magnet of the deflection yoke to obtain a clear picture in the center of the gray scale.
5	Brightness	• Iris: Closed (Lens capped)	• E. VF	• VR4 (BRIGHT) 5 0 VF board	1) Close the iris and adjust VR4 so that the raster of CRT is just barely visible in the viewfinder.
6	Contrast	• MH-C1 Gray scale PB	• E. VF	• VR3 (CONT) 5 0 VF board	1) Observing the viewfinder screen, adjust VR3 so that gradation of the gray scale becomes the best.

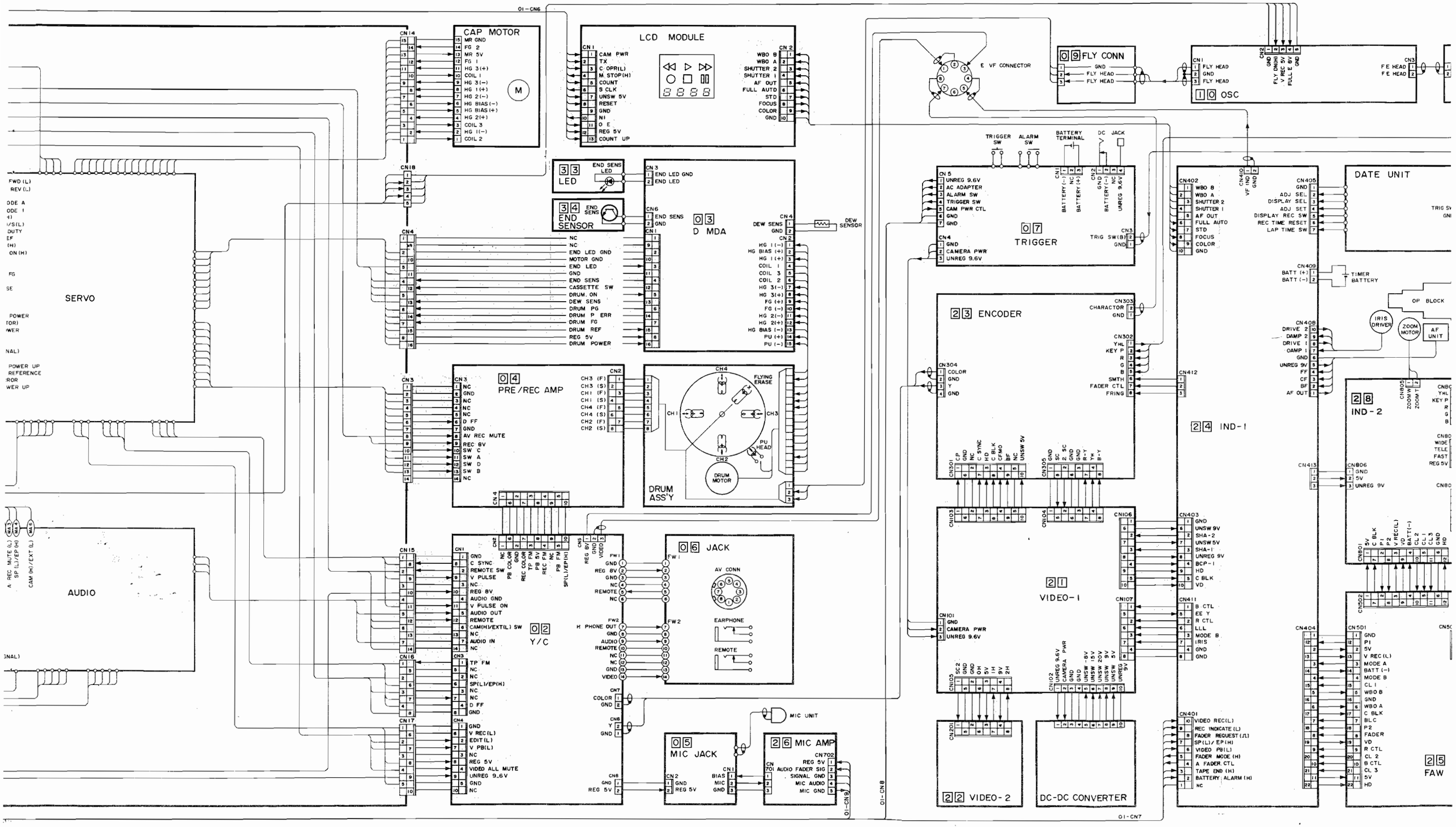


SECTION 4
OVERALL WIRING AND BLOCK DIAGRAMS

1 OVERALL WIRING



SECTION 4
OVERALL WIRING AND BLOCK DIAGRAMS



S

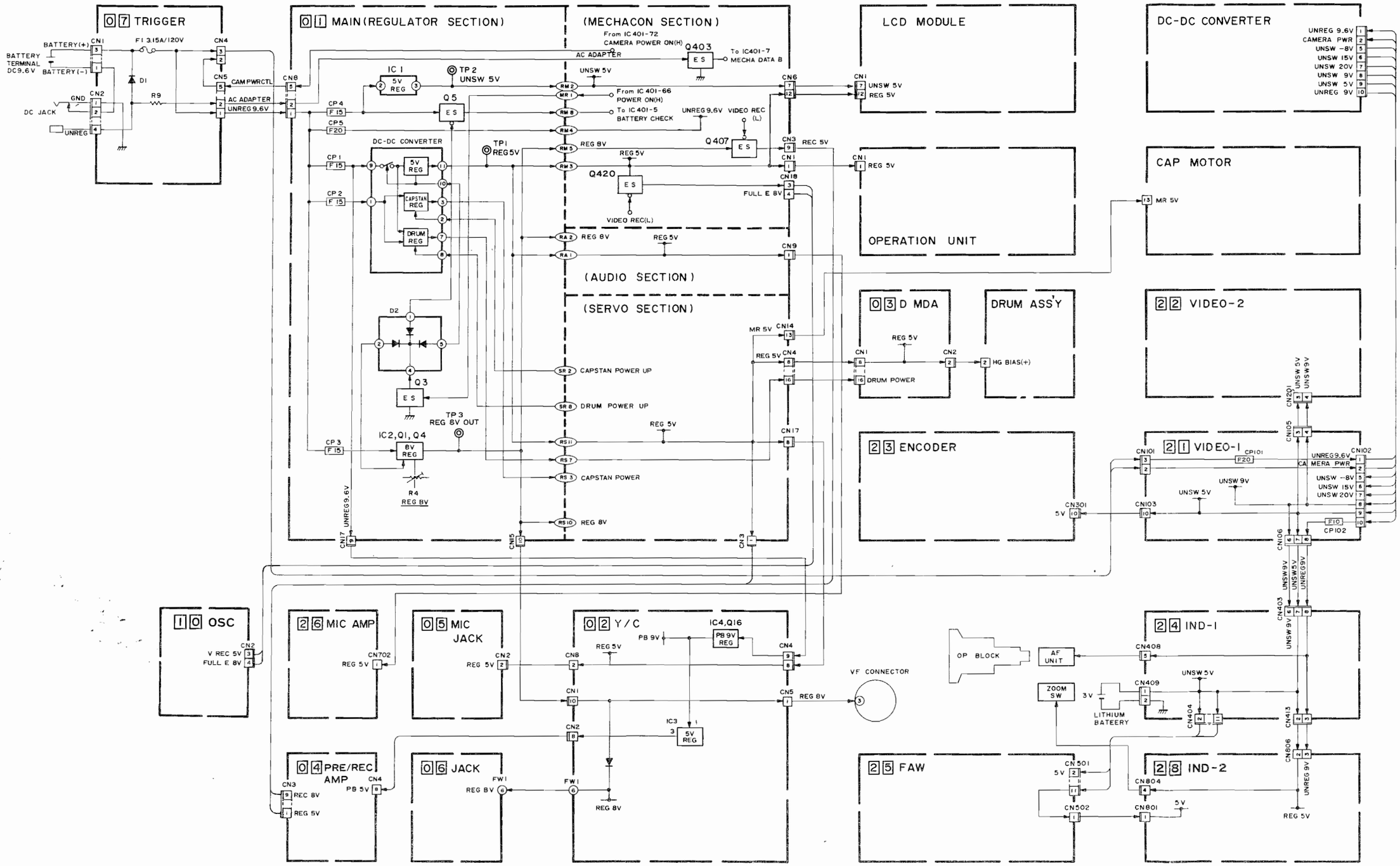
Patchcords

Patchcords are available for blue shaded portions of the overall wiring.

The patchcords are provided with tags to indicate connection points. Connect as indicated.

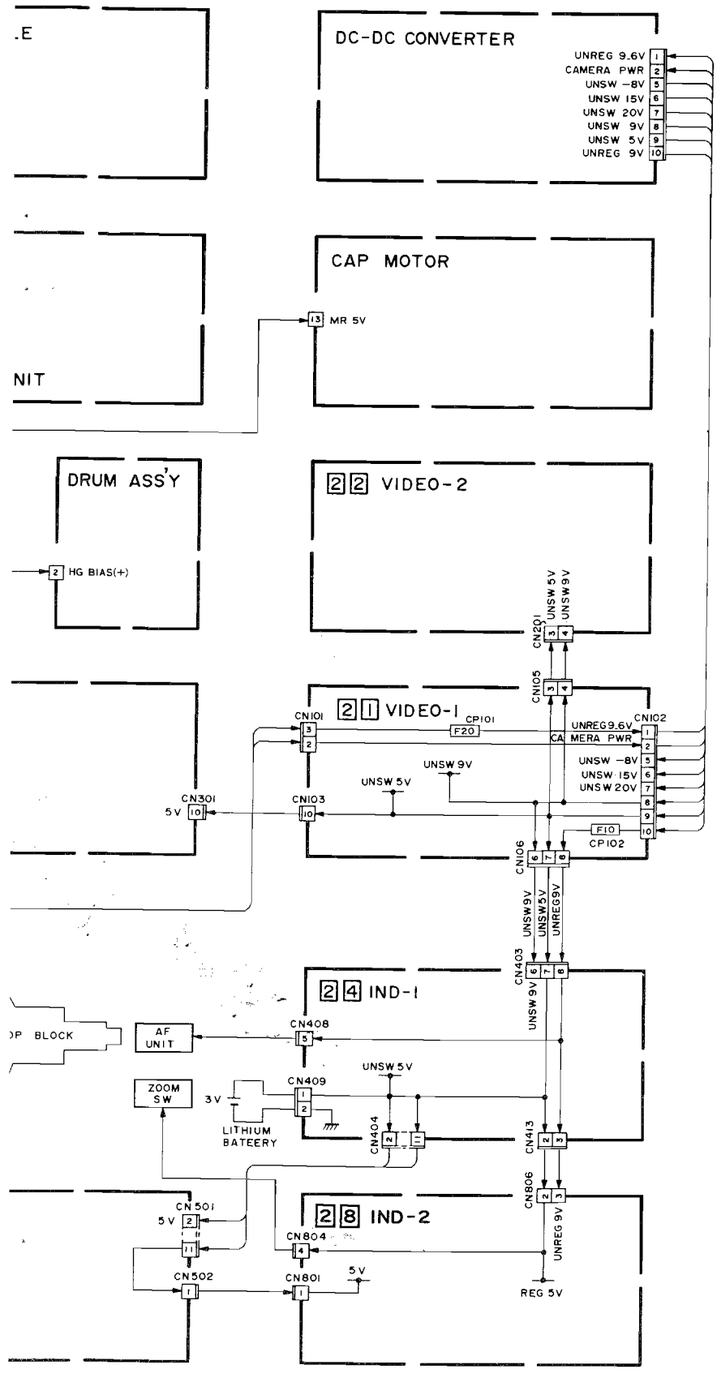
Example: As shown in the Figure, connect one side to MAIN board and the other to Y/C board.

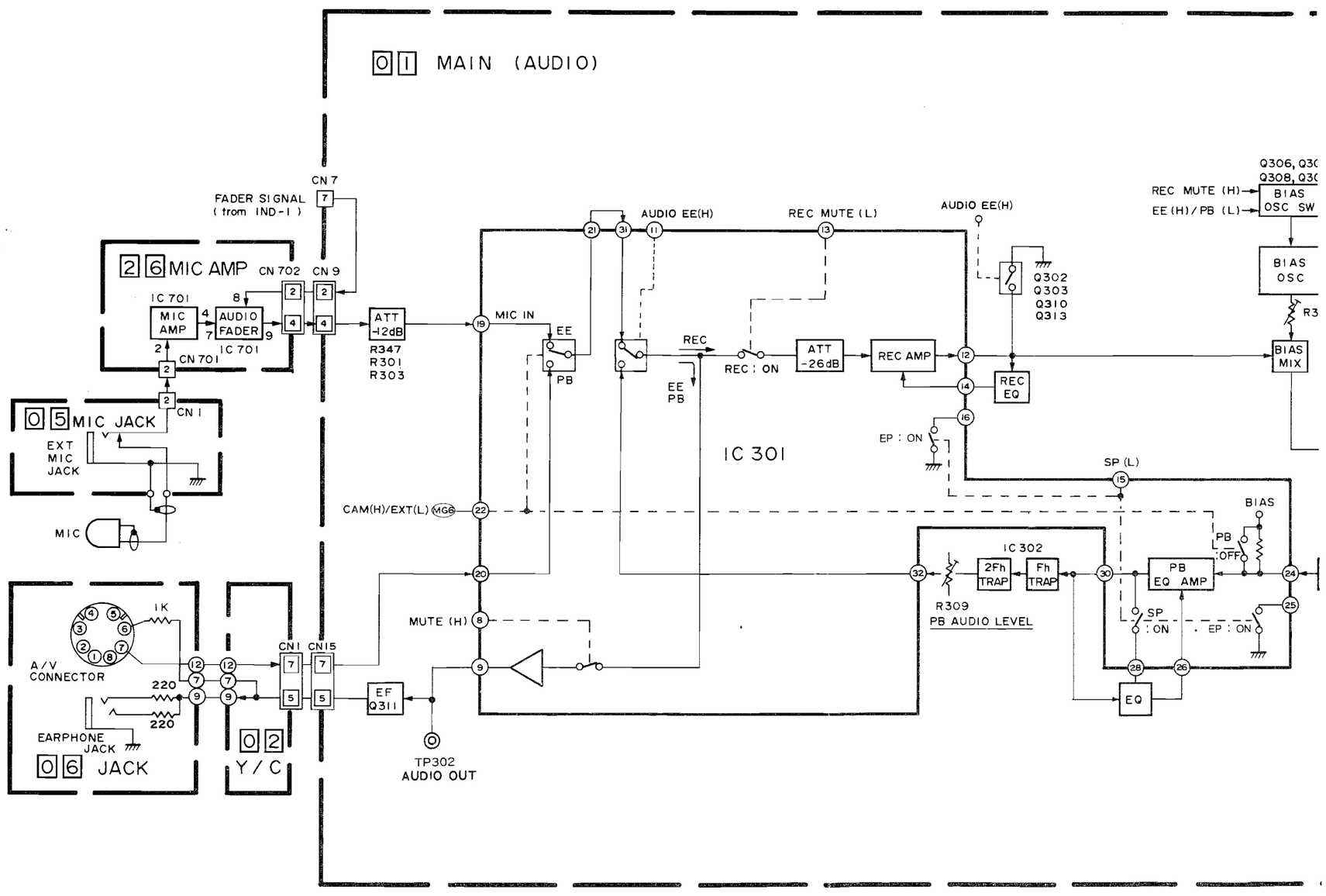
34	END SENSOR
33	LED
28	SW
28	IND-2
26	MIC AMP
25	FAW
24	IND-1
23	ENC
22	VIDEO-2
21	VIDEO-1
10	OSC
09	FLY CONN
08	SENSOR
07	TRIGGER
06	JACK
05	MIC JACK
04	PRE AMP
03	D MDA
02	Y/C
01	MAIN
NO	PWB NAME


07 TRIGGER
01 MAIN (REGULATOR SECTION)
(MECHACON SECTION)
LCD MODULE
DC-DC CONVERTER
OPERATION UNIT
CAP MOTOR
03 D MDA
DRUM ASS'Y
22 VIDEO-2
23 ENCODER
21 VIDEO-1
24 IND-1
28 IND-2
25 FAW
10 OSC
26 MIC AMP
05 MIC JACK
02 Y/C
04 PRE/REC AMP
06 JACK
05 MIC
EXT MIC JACK
MIC
A/V CONNECTOR
EARPHONE
06
OP BLOCK
AF UNIT
ZOOM SW
LITHIUM BATEERY
VF CONNECTOR
BATTERY(+)
BATTERY TERMINAL DC9.6V
BATTERY(-)
GND
DC JACK
UNREG
F1 3.15A/120V
D1
R9
CAM PWRCTL
AC ADAPTER
UNREG 9.6V
IC1 5V REG
TP2 UNSW 5V
Q5
Q403
To IC401-7 MECHA DATA B
From IC401-72 CAMERA POWER ON(H)
From IC401-66 POWER ON(H)
To IC401-5 BATTERY CHECK
VIDEO REC (L)
Q407
Q420
TP1 REG5V
REG 8V
REG 5V
FULL E 8V
VIDEO REC(L)
D2
Q3
TP3 REG 8V OUT
IC2,Q1,Q4 8V REG
R4 REG 8V
CAPSTAN POWER UP
DRUM POWER UP
CAPSTAN POWER
REG 8V
IC4,Q16 PB 9V REG
IC3 5V REG
REC 5V
PB 5V
PB 9V
MR 5V
HG BIAS(+)
DRUM POWER
UNSW 5V
UNSW 9V
UNREG 9.6V
CAMERA PWR
UNSW -8V
UNSW 15V
UNSW 20V
UNREG 9V
CN1 CN2 CN3 CN4 CN5 CN6 CN7 CN8 CN9 CN14 CN15 CN17 CN18 CN101 CN102 CN103 CN105 CN106 CN201 CN205 CN301 CN403 CN404 CN408 CN409 CN413 CN501 CN502 CN606 CN702 CN801 CN804
CP1 CP2 CP3 CP4 CP5 CP101 CP102
F15 F20 F10
RM1 RM2 RM3 RM4 RM5 RM8 RA1 RA2 RS2 RS3 RS7 RS8 RS10 RS11
FW1

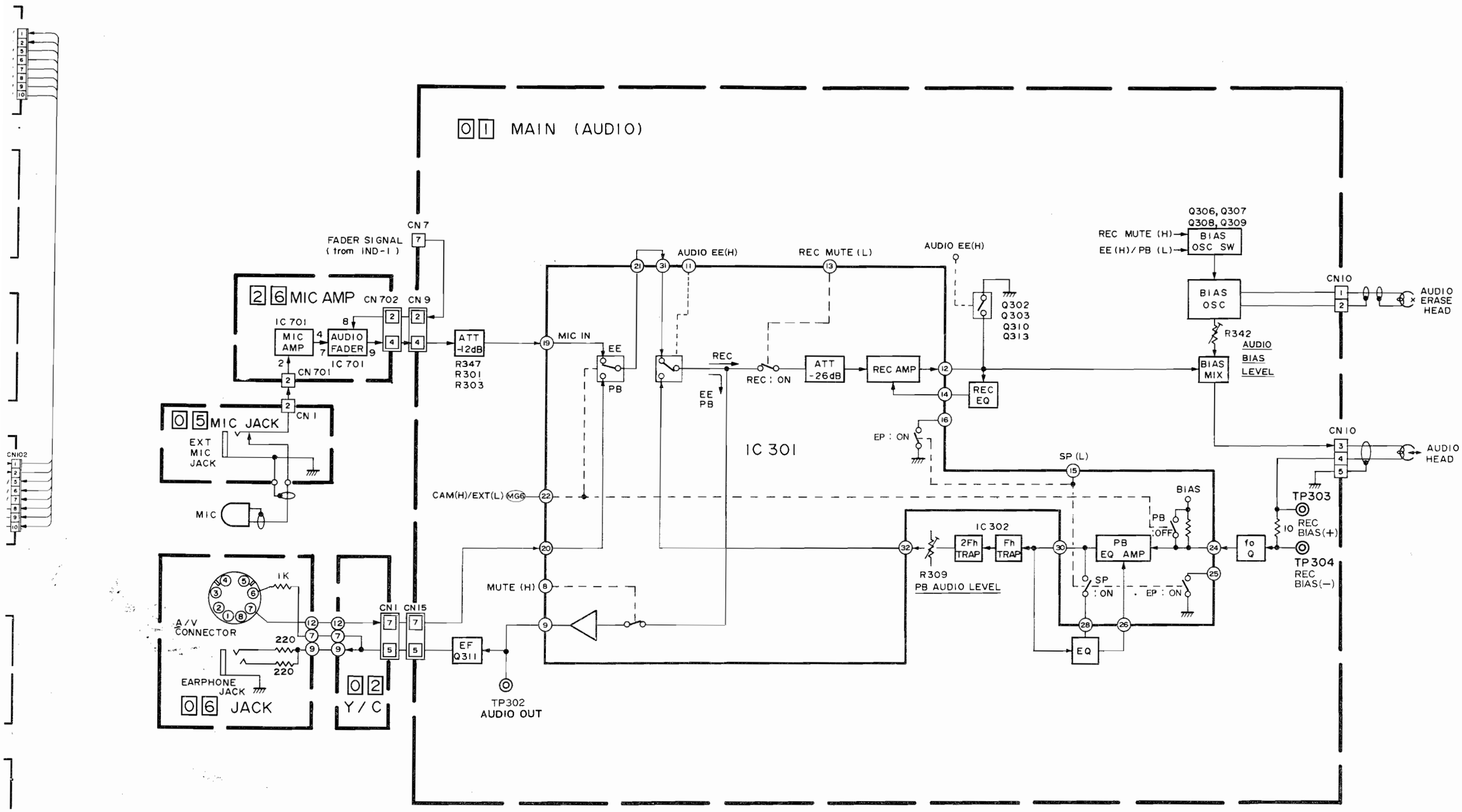
4-2

4.3 AUDIO BLOCK DIAGRAM

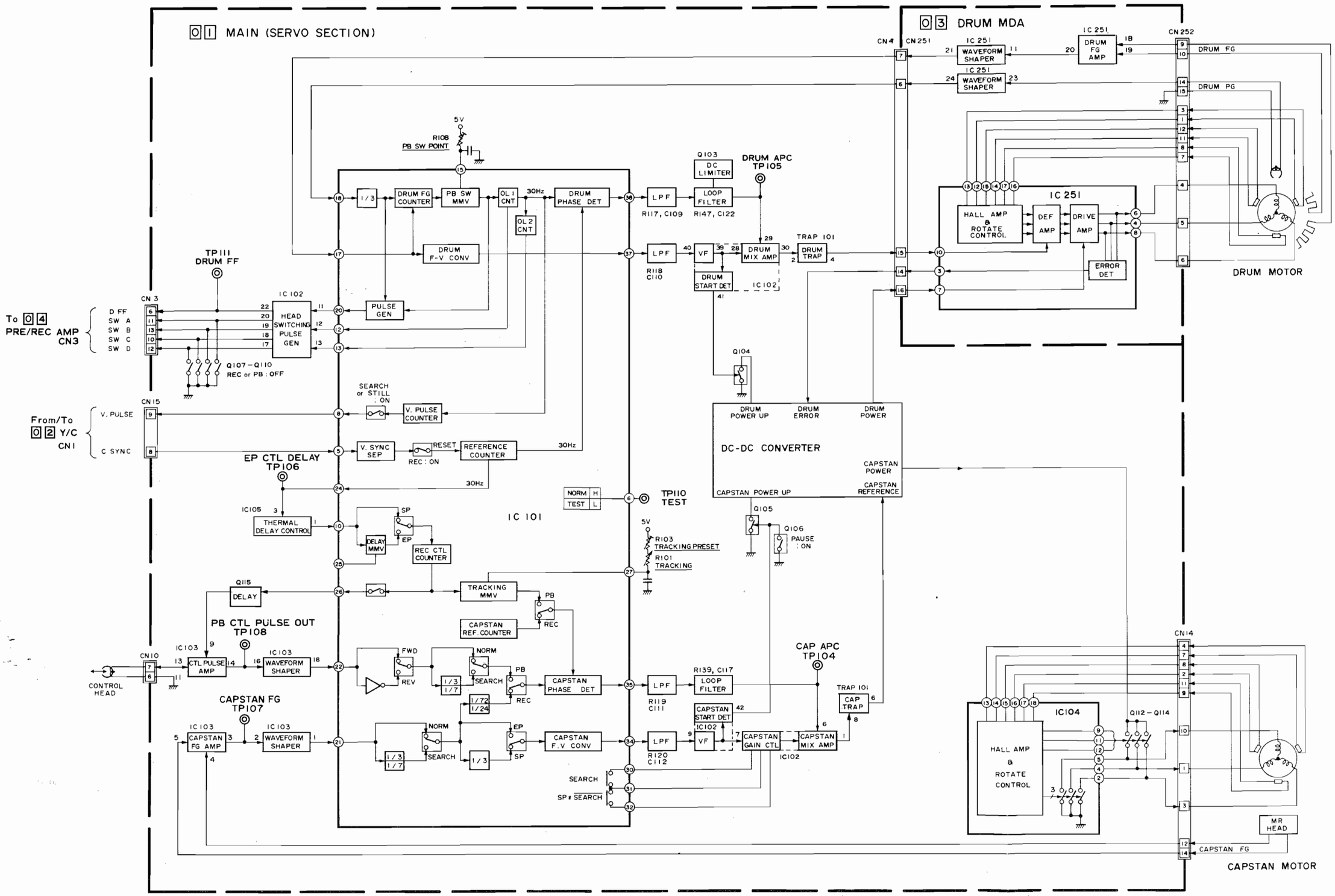




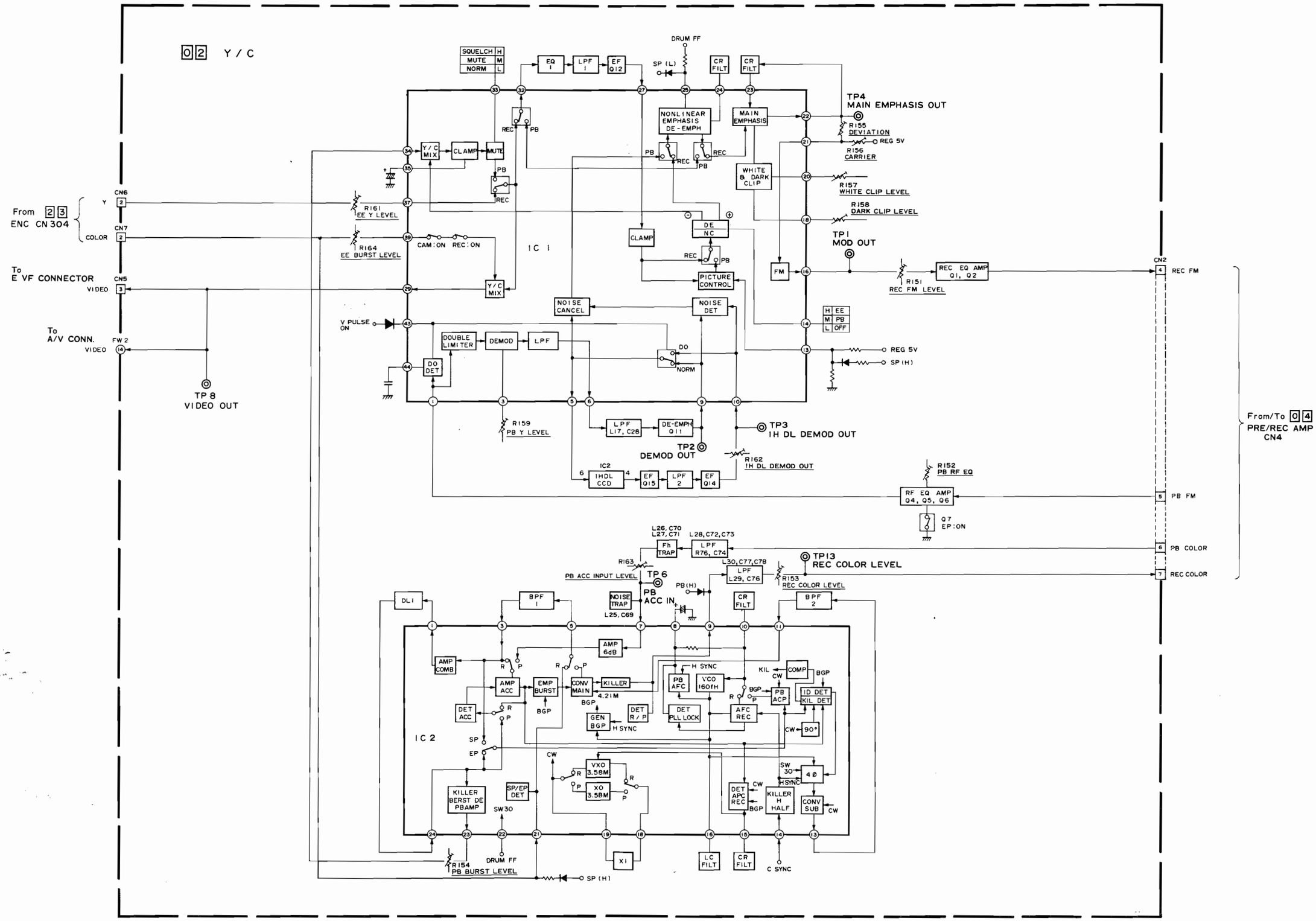
4.3 AUDIO BLOCK DIAGRAM



4.4 SERVO BLOCK DIAGRAM

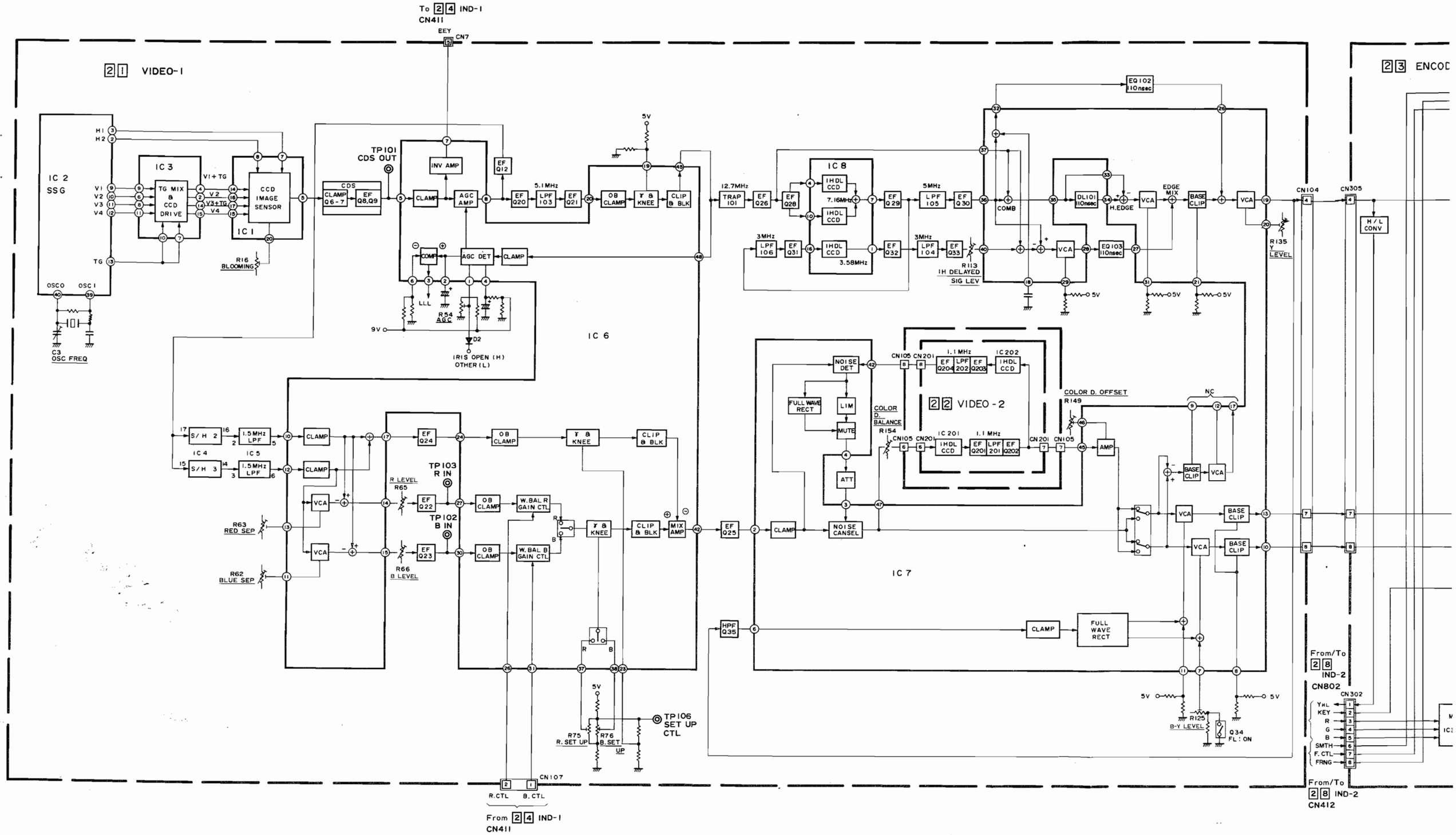


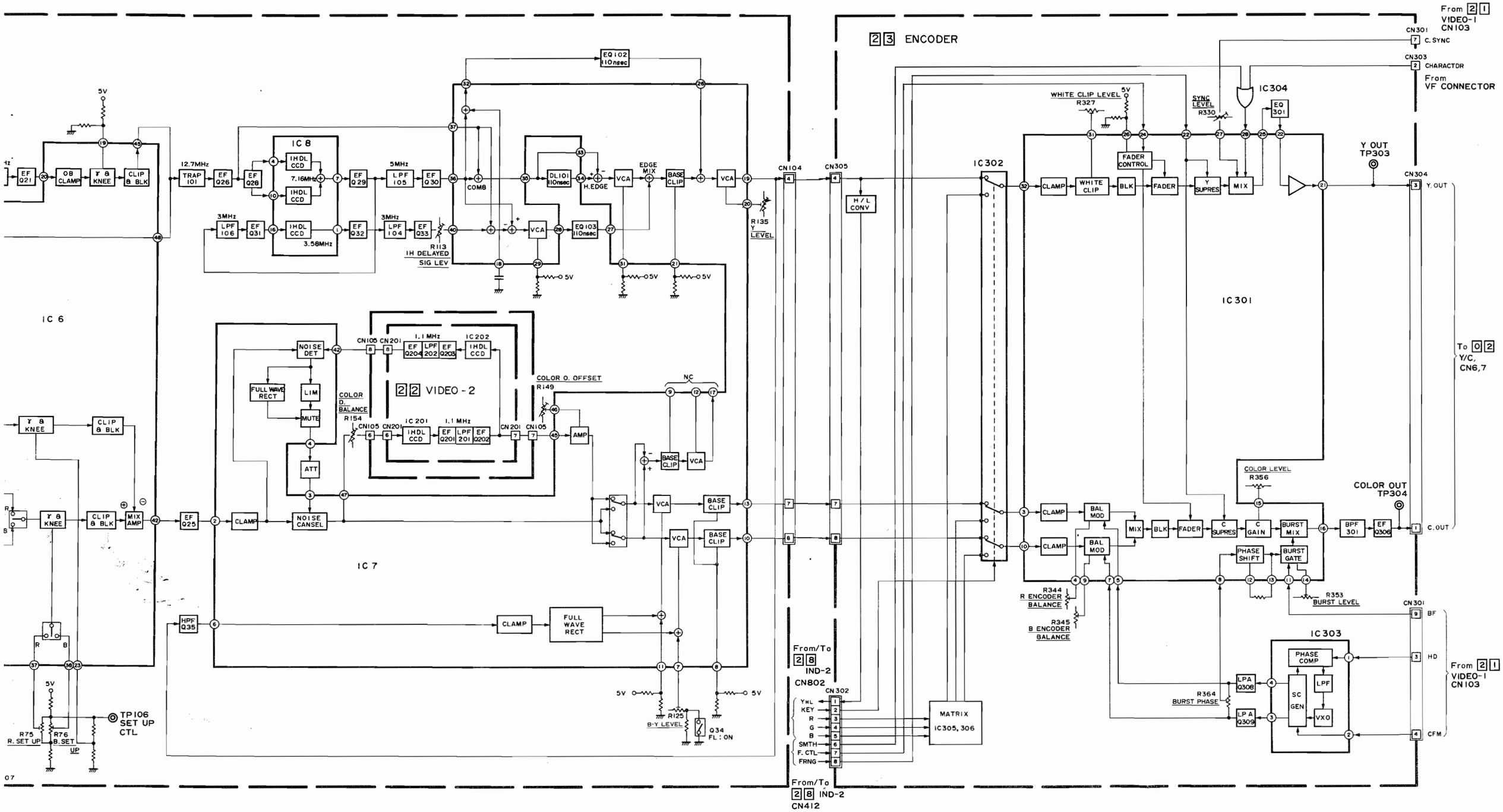
4.5 Y/C BLOCK DIAGRAM



4-4

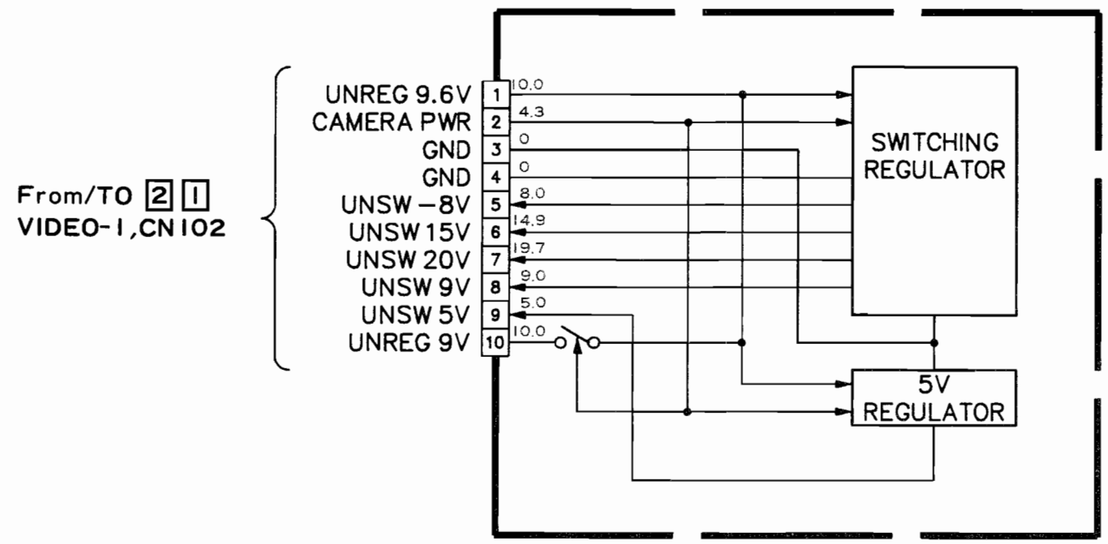
4.6 VIDEO BLOCK DIAGRAM




2 3 ENCODER
From 2 1 VIDEO-1 CN103
CN301 7 C. SYNC
CN303 2 CHARACTDR
From VF CONNECTOR
IC 6
IC 8
IC 7
IC 301
IC 302
IC 304
IC 303
2 2 VIDEO - 2
12.7MHz
TRAP 101
EF Q21
OB CLAMP
γ & KNEE
CLIP & BLK
EF Q26
EF Q28
EF Q29
EF Q30
EF Q31
EF Q32
EF Q33
LPF 105
LPF 106
LPF 104
5MHz
3MHz
7.16MHz
3.58MHz
1HDL CCD
COMB
DL101 110nsec
EQ102 110nsec
EQ103 110nsec
H.EDGE
EDGE MIX
VCA
BASE CLIP
R113 1H DELAYED SIG LEV
R135 Y LEVEL
0 5V
CN104
CN305
H/L CONV
WHITE CLIP LEVEL R327
SYNC LEVEL R330
EQ 301
FADER CONTROL
CLAMP
WHITE CLIP
BLK
FADER
Y SUPRES
MIX
Y OUT TP303
CN304
Y. OUT
To 0 2 Y/C, CN6,7
NOISE DET
FULL WAVE RECT
LIM
MUTE
ATT
NOISE CANSEL
COLOR D. BALANCE R154
COLOR O. OFFSET R149
CN105 CN201
1.1 MHz
IC202
IC201
EF Q204
LPF 202
EF Q203
EF Q201
LPF 201
EF Q202
IHDL CCD
AMP
NC
γ & KNEE
CLIP & BLK
MIX AMP
EF Q25
CLAMP
HPF Q35
FULL WAVE RECT
R B
TP106 SET UP CTL
R75 R. SET UP
R76 B. SET UP
R125 B-Y LEVEL
Q34 FL : ON
From/To 2 8 IND-2
CN802
CN302
YHL
KEY
R
G
B
SMTH
F. CTL
FRNG
From/To 2 8 IND-2
CN412
MATRIX IC305, 306
BAL MOD
MIX
BLK
FADER
C SUPRES
C GAIN
BURST MIX
BPF 301
EF Q306
C. OUT
COLOR LEVEL R356
COLOR OUT TP304
PHASE SHIFT
BURST GATE
R353 BURST LEVEL
R344 R ENCODER BALANCE
R345 B ENCODER BALANCE
R364 BURST PHASE
PHASE COMP
SC GEN
LPF
VXO
LPA Q308
LPA Q309
CN301 9 BF
3 HD
4 CFM
From 2 1 VIDEO-1 CN103

4.7 DC-DC CONVERTER BLOCK DIAGRAM

Note:
This block diagram is only for reference.
Avoid replacing individual parts.
Replace the entire unit only.

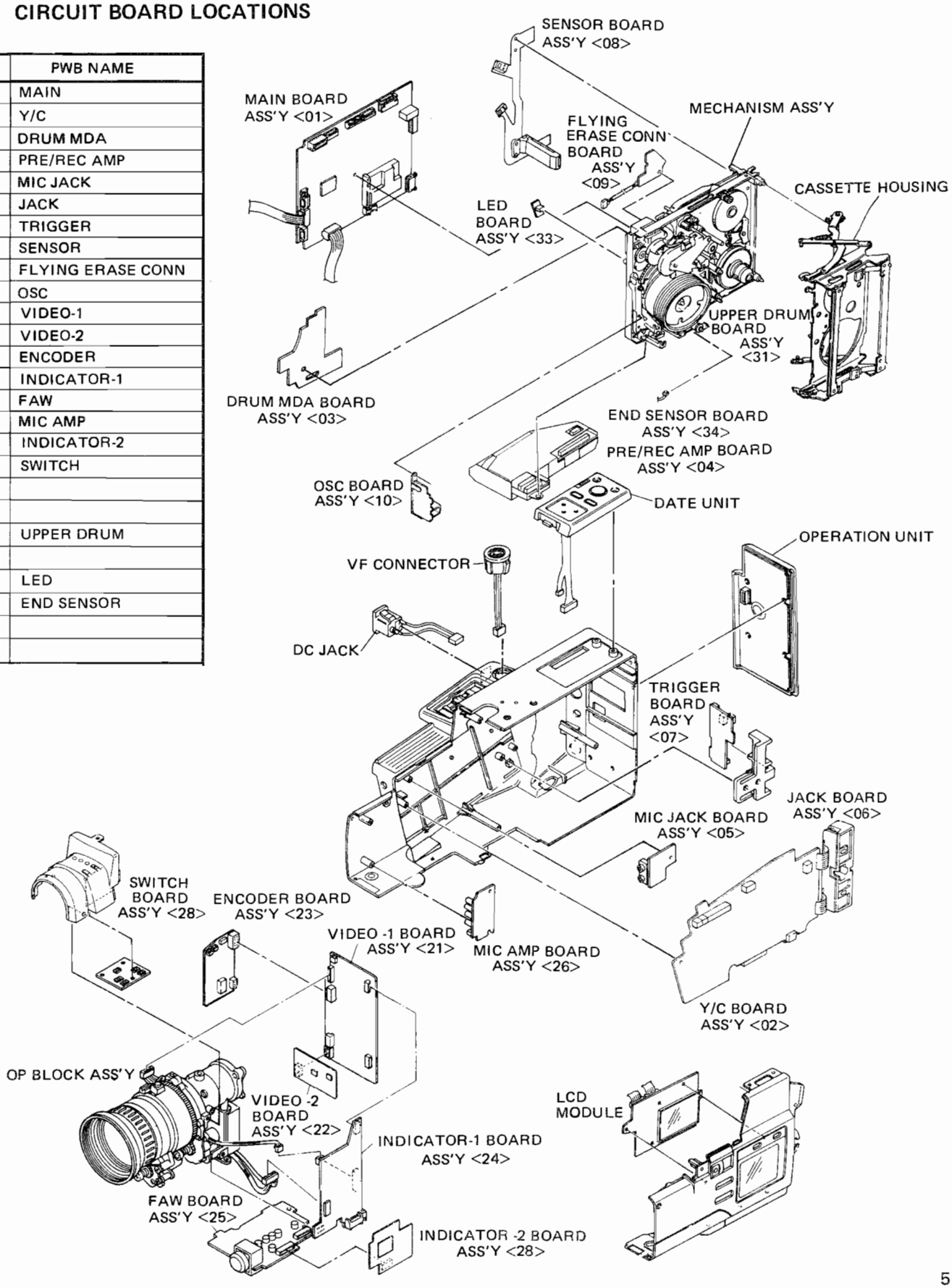


4-6

SECTION 5
DIAGRAMS AND CIRCUIT BOARDS

5.1 CIRCUIT BOARD LOCATIONS

No.	PWB NAME
01	MAIN
02	Y/C
03	DRUM MDA
04	PRE/REC AMP
05	MIC JACK
06	JACK
07	TRIGGER
08	SENSOR
09	FLYING ERASE CONN
10	OSC
21	VIDEO-1
22	VIDEO-2
23	ENCODER
24	INDICATOR-1
25	FAW
26	MIC AMP
28	INDICATOR-2
28	SWITCH
31	UPPER DRUM
33	LED
34	END SENSOR



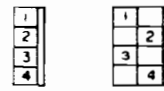
5.2 SCHEMATIC DIAGRAM NOTES

1. ▒▒ parts are safety related parts. When replacing them, be sure to use the specified parts.
2. Unit indications

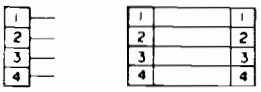
No units: [Ω] K: [kΩ] M: [MΩ]　　No units: [μF] P: [pF]　　No units: [μH] m: [mH]

Thermistor　　Thermal Fuse　　Circuit Protector

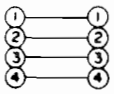
Posistor



: Connector



: Board in connector

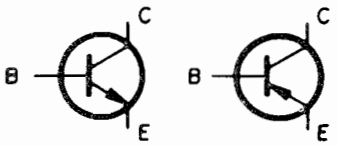


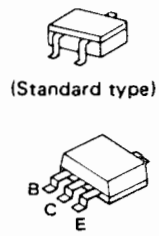
: Direct connection

COUNT UP : Active only at high.
COUNT DOWN : Active only at low.

(VS) : Connected pattern in the board.
Abbreviations
(MS) V : Video　　M : Mechacon
(SM) S : Servo　　A : Audio
VS : Signal flow from video to servo.

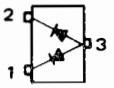
3. Chip transistor



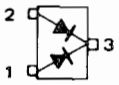


4. Chip diode

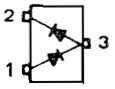
DAP202U
MA141WA

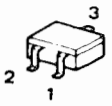


DAN202U
MA141WK

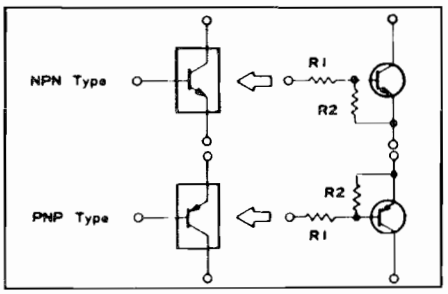


MA143
DA204U





5. Digital transistor



RESISTOR VALUES

JUNCTION	Part No.	R1 (kΩ)	R2 (kΩ)
PNP	DTA124EU	22	22
NPN	DTC144EU	47	47
	DTC124EU	22	22

Note: The digital transistor includes built in resistors.
It features small size and high reliability.
Both PNP and NPN types are available.
USES: INVERTER, INTERFACE, DRIVER CIRCUITS.

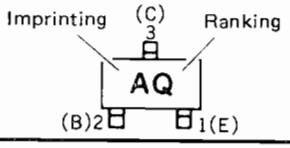
6. Definition of the surface and the back of circuit board diagrams
Front : Side on which discrete parts are assembled
Rear : Side on which chip parts are assembled

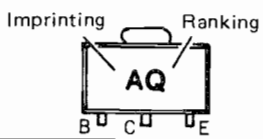
5.3 REPLACING SUBMINIATURE "CHIP" PARTS

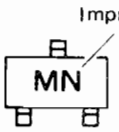
1. Some resistors, shorting jumpers (0 Ω resistance), ceramic capacitors, transistors, and diodes are chip parts. These chip parts cannot be reused after they are once removed.
2. Additional compactness is achieved by using subminiature chip parts for certain circuit elements. When replacing these parts, note the cautions outlined below.
3. Chip transistors and diodes used in this model are outlined bellow.
4. Refer to parts list for correct part numbers.

- **Chip transistor and chip diode imprinting**

Transistors				Diodes	
Type	Imprinting	Type	Imprinting	Type	Imprinting
DTA124EU	15	2SB798	DM, DL, DK	DAN202U	N
DTA144EU	16	2SC2412K(S)	BS	DAP202K	P
DTC124EU	25	2SC3931	UB~UD	DAP202U	P
DTC124XU	45	2SC3936(BC)	KB, KC	DA204U	K
DTC144EU	26	2SC4081	BQ~BS	FMN1	N1
FMC2	C2	2SC4097(QR)	CQ, CR	IMN10	N10
FMG1	G1	2SC4098(PQ)	AP, AQ	MA141WA	MN
FMG2	G2	2SC4099(NP)	JN, JP	MA141WK	MT
FMQ1	Q1	2SC4176	B33, B34, B35	MA143	MC
FMS2	S2	2SC4177(56)	L5, L6	MA3075H	7.5H
FMU1	U1	2SC4178(34)	F13, F14	MA704	MIK
FMW1	W1	2SC4181	L17, L18	MA714	MIP
FMW3	W3	2SD1819	YR~YS	MA716	M1U
2SA1036K(QR)	HQ ~ HR	2SJ146	4D	RB451F	3C
2SA1532(BC)	EB, EC	2SK198P,Q	10P, 10Q	RD7.5M-T1B2	752
2SA1576	FQ ~ FS	2SK620	3N	RD7.5M-T2B2	752
2SA1577	HQ ~ HS	2SK665	30	RLZ5.6B	753
2SA1610	Y33, Y34	3SK179	V03	RLZ8.2B	822
2SA1611(56)	M5, M6			RD7.5MB3	125
2SB1218(RS)	AR, AS			RD8.2MB2	165
2SB624	BV4				







5.4 KEY TO ABBREVIATIONS

A

AC	: Alternating Current
ACC	: Automatic Color Control
A/CTL	: Audio/Control
ADC	: Analog to Digital Converter
ADD	: Adder
ADJ	: Adjustment
AE	: Audio Erase
AEF	: Automatic Editing Function
AF	: **Auto Focus**
AFC	: Automatic Frequency Control
AFT	: Automatic Fine Tuning
AGC	: Automatic Gain Control
AH	: Audio Head
AL	: **After Loading, Allways**
ALC	: Automatic Light Compensation Automatic Level Control
ALM	: Alarm
ALU	: Arithmetic Logic Unit
AM	: Amplitude Modulation
AMP	: Amplifier
ANT	: Antenna
APC	: Automatic Pedestal Control Automatic Phase Control
APL	: Average Picture Level
A·S·M	: Audio/Servo/Mechacon
ASS'Y	: Assembly
ATT	: Attenuator
AUD	: Audio
AUTO	: Automatic
AUX	: Auxiliary

B

B	: **Base, Blue**
BAL	: Balance
BATT	: Battery
BBD	: Bucket Brigade Device
BCD	: Binary Coded Decimal
BEG	: Beginning
BF	: **Behind Focus**
BFP	: Burst Flag Pulse
BPF	: **Band Pass Filter**
BIT	: Binary Digit
BLK	: Black, Blanking
BLU	: Blue
BNC	: Bayonet Connector
BOT	: Beginning of Tape
BPF	: Bandpass Filter
BRK	: Brake
BRN	: Brown
BRT	: Brightness
BT	: Band Tuning
BUFF	: Buffer
BW or B/W	: Black and White

C

C	: **Capacitance, Collector, Color, Character**
CA	: **Camera**
CAL	: Calibration
CAP	: Capstan, Capacitor
CAR	: Carrier
CARR	: Carrier
CASS	: Cassette
CC	: Cassette Compartment
CCD	: Charge Coupled Device
CCT	: Circuit
CdS	: Cadmium Sulphide
CD	: Count Down
CE	: Chip Enable
CF	: **Ceramic Filter, Color Frame, Correct Focus**
CH	: Channel
CHG	: Charge
CHROMA	: Chrominance
CLK	: Clock
CLR	: Clear
CMD	: Command
CMOS	: Complementary Metal Oxide Semiconductor
CNT	: Count, Counter
COL	: Color
COM	: Common
COMB	: Combination Comb Filter
COMP	: Comparator Composite Compensation
CONN	: Connector
CONV	: Converter
CP	: Circuit Protector Clamp Pulse
CPC	: Capstan Phase Control
CPU	: Central Processing Unit
CTC	: Crosstalk Cancel
CTL	: Control

D

D	: Drum, Digital, Diode, Drain
DAC	: Digital to Analog Converter
dB	: Decibel
DC	: Direct Current
DD	: Direct Drive
DEC	: Decoder
DEMOD	: Demodulator
DEMUX	: Demultiplexer
DET	: Detector
DEV	: Deviation
DFRS	: Drum Free Running Stop
DG	: Differential Gain
DIF	: Differential
DISCR	: Discriminator
DL	: Delay Line
DOC	: Dropout Compensator
DOD	: Drop Out Detector
DP	: Differential Phase
DPC	: Drum Phase Control
DYAC	: Dynamic Aperture Control

E

E	: Edit, Emitter
EDP	: Electronic Data Processing
E-E	: Electric to Electric
EF	: Emitter-Follower
EMP	: Emphasis
EN	: Enable
ENC	: Encoder
ENV	: Envelope
EOT	: End of Tape
EP	: Extended Play
EQ	: Equalizer
ES	: Electronic Switch
ESNS	: End Sensor
EXP	: Expander
EXT	: External

F

F	: Farad, Fuse
F ADV	: Frame Advance
FDP	: Fluorescent Display Panel
FE	: Full Erase
FET	: Field Effect Transistor
FF	: **Fast Forward, Front Focus** Flipflop
FG	: Frequency Generator
FM	: Frequency Modulation
FR	: Full Recording, Frame, Fusible Resistor
FREQ	: Frequency
F-V CONV	: Frequency to Voltage Converter
FWD	: Forward
FWD S	: Forward Search

G

G	: Green, Gate, Grid
GEN	: Generator
GND	: Ground
GRN	: Green
GRY	: Gray

H

H	: High, Henry, Hour
HBF	: Horizontal Burst Flag
HD	: Horizontal Drive
HPF	: Highpass Filter
Hz	: Herz

I	IC	: Integrated Circuit
	ID	: Identification (Pulse)
	IF	: Intermediate Frequency
	IFR	: Infrared
	IFT	: Intermediate Frequency Transformer
	IND	: Indicator
	INH	: Inhibit
	INS	: Insert
	INT	: Internal, Interrupt
	INV	: Inverter, Interleave
	I/O	: Input/Output
	IR	: Infrared
L	L	: Low, Left
	LCD	: Liquid Crystal Display
	LED	: Light Emitting Diode
	LIM	: Limiter
	LIN	: Linearity
	LLD	: Low Light Detector
	LOAD	: Loading (Cassette)
	LP	: Long Play
	LPF	: Lowpass Filter
	LSB	: Lower Sideband
M	M	: Motor, Mega
	MAX	: Maximum
	MDA	: Motor Drive Amplifier
	MECHACON	: Mechanism Control
	MIC	: Microphone
	MIN	: Minimum
	MIX	: Mixer, Mixing
	MMV	: Monostable Multivibrator
	MNOS	: Metal Nitride Oxide Semiconductor
	MOD	: Modulation, Modulator
	MODEM	: Modulator-Demodulator
	MON	: Monitor
	MOS	: Metal Oxide Semiconductor
	MPX	: Multiplexer, Multiplex
	MS	: Mode Select
	MUT	: Muting
N	NAND	: Not-And
	NC	: Not Connected, Normally Closed
	NFB	: Negative Feedback
	NLN	: Non-Linear
	NO	: Normally Open
	NOR	: Normal, Not-Or
	NR	: Noise Reduction
O	OP	: Operation
	OPAMP	: Operational Amplifier
	ORG	: Orange
	OSC	: Oscillator
P	PB	: Playback
	PC	: Photocoupler, Pulse Counter
	PCM	: Pulse Code Modulation
	PG	: Pulse Generator
	PGM	: Program
	PI	: Photo Interrupter
	PIC	: Picture Control
	PIF	: Picture Intermediate Frequency
	PLA	: Programmable Logic Array
	PLL	: Phase Locked Loop
	PNK	: Pink
	POS	: Position
	p-p	: Peak-to-Peak
	PR	: Pinch Roller
	PREAMP	: Preamplifier
	PRL	: Preroll
	P/S	: Pause/Still
	PSC	: Pulse Swallowing Control
	PU	: Pickup
	PUT	: Programmable Unijunction Transistor
	PWB	: Printed Wiring Board
	PWM	: Pulse Width Modulation
	PWR	: Power
Q	Q	: Quality Factor
R	R	: Red, Right
	RA	: Resistor Array
	RAM	: Random Access Memory
	REC	: Recording
	REF	: Reference
	REG	: Regulated, Regulator
	REM	: Remote
	REMOCON	: Remote Control (Unit)
	REV	: Reverse
	REV S	: Reverse Search
	REW	: Rewind
	RF	: Radio Frequency
	ROM	: Read Only Memory
	R/P	: Record/Playback
	RPT	: Repeat
	RS FF	: RS Flipflop
	RST	: Reset
	RT	: Rotary Transformer
	RUN	: Running
	RY	: Relay
S	SAW	: Sawtooth, Surface Acoustic Wave
	SC	: Subcarrier, Simulcast
	SCH	: Search
	SEL	: Select, Selector
	SENS	: Sensor
	SEP	: Separator
	SF	: Source Follower
	SFF	: Short Fast Forward
	SIF	: Sound Intermediate Frequency
	SN	: Signal to Noise Ratio
	SOL	: Solenoid
	SOS	: Sound on Sound
	SP	: Standard Play
	SR	: Supply Reel
	SREW	: Short Rewind
	S/S	: Slow/Still
	SSG	: Sync Signal Generator
	SSNS	: Start Sensor
	STD	: Strobe Data, Standard
	SUP	: Supply
	SW	: Switch
	SWD	: Switched
	SYNC	: Synchronization
T	TAL	: Tally
	TBC	: Time Base Corrector
	TC	: Tension Control, Time Code
	TEN	: Tension
	TF	: Thermal Fuse
	TIM	: Timing
	TK	: Tracking
	TNR	: Tuner
	TP	: Test Point
	TPZD	: Trapezoid
	TR	: Transistor, Trimmer
	TRANS	: Transformer
	TU	: Take-Up
U	UL	: Unloading
	UNREG	: Unregulated
	UNSW	: Unswitched
V	V	: Vertical, Volt
	VACT	: Video Action
	VCO	: Voltage Controlled Oscillator
	VD	: Vertical Drive
	VIF	: Video Intermediate Frequency
	VLT	: Violet
	VR	: Variable Resistor
	VS	: Video and Sync
	VSCH	: Variable Search
	VV	: Video to Video
	VXO	: Variable Crystal Oscillator
W	W	: Watt
	WARN	: Warning
	W & D	: White and Dark
	WHT	: White
	WV	: Working Voltage
X	XTAL	: Crystal
Y	Y	: Luminance
	YEL	: Yellow

5.5 SEMICONDUCTOR SHAPES

	NAME	L
	IC	
A	AFZ72F45A1	8D
	AFZ74A001X1	7A
	AFZ74A002X1	7A
	AN2275S	5D
	AN2276S	5D
	AN3212S	1C
	AN3323S	1C
	AN3592S	2F
	AN6308S	1A
	AN8009	6E
B	BA10324F	1B
	BA226F	1A
	BA6452F	7C
	BA6993F	1A
	BA7131F	1A
	BA7258AK	4A
	BA7288K	4A
	BA7600K	4A
	BA7601K	4A
	BA7606F	8B
	BA7751AF	7C
	BA7757BK	2B
	BA7757K	2B
	BU3721K	4A
	BU3767K	4A
	BU4011BF	1B
	BU4584BF	1B
C	CP1088G	1D
	CP1089G	1D
H	HD6305Z0F-CV05	3B
	H8B7101	1F
	H8D7046	4C
	H8D7047	3C
	H8D7048	2C
	H8D7051A	8A
	H8D7091A	5E
	H8D7091B	3E
	H8D7098	3C
	H8D7102	3E
	H8D7103	3E
I	IR3702N1	1B
L	LA7213	4D
	LA7316	7C
M	MB671458	3B
	MC8089A	3D
	MC8180B	1E
	MC8181D	1E
	MC8182D	1E
	MN12821(QR)	6F
	MN3106S	1A
	MSM6829MS	1A
	MSM6830	6A
	MSM6831	6A
	MSM6846MS	1A
	MSM6847MS	1A
	MSM6855MS	6A
	MSM6967MS	1A
	MSM6964-3MS-WK	1A
	MSM6984MS	1A
	MSM6985MS	1A
	MSM69852MS	1A
	MSM6989MS	1A
	M37412M4-003FP	8E
	M50966-150FP	8E
	M51282FP	4E
	M51646FP	1C
	M51648FP	6B
	M51798FP	5A
	M51799FP	5A
	M52074FP	3F
	M5236ML	3A
	M52410FP	6A
	M52434FP	5A
	M5282FP	1A
	M54543ASL	5B

	NAME	L
	M54543ASL-A	5B
	M54641FP	2E
	M5M5256FP	1C
N	NJM2233AM	1A
	NJM2244M	1A
	NJM2245M	1A
	NJM2246M	1A
	NJM2904E	1A
	NJM4560M	8C
S	S-81250AG	2A
	S-81252HG	2A
	S8054HN	4B
T	TC4S69F	6D
	TC4S71F	6D
	TC4S81F	6D
	TC7S32F	6D
	TC74HC32AF	1B
	THE175A	4D
	THE191A	5C
	THE245	8A
	THE257A	8F
	THE326A	7F
	TME234	6C
	TME336	4C
U	UPC2370GH	2D
	UPC2371GH	2D
	UPC324G2	1B
	UPD4013BG	7E
	UPD4538BG	8B
	UPD6147G	6A
	UPD6148GS	7C
	UPD9319BGC	4F
V	VC2031MP	7B
	VC2038	4E
	VC2039	7D
	VC2041	7C
	VC2043	7D
	VC2044	7D
	VC2073	7D
	VC2079B	5B
	VC2081	3B
	VC2085	5F
	VC2089	8E
	VC2092	7D
	VC5026G	6A
	28VT03	5C
	6VT07	3E
	6VT08	3E
	TRANSISTOR	
D	DTA124EU	1G
	DTA144EU	1G
	DTC124EU	1G
	DTC124XU	1G
	DTC144EK	1G
	DTC144ES	7G
	DTC144EU	1G
	DTC144WK	1G
	DTC144WU	1G
F	FMC2	5G
	FMG1	6G
	FMG2	6G
	FMQ1	6G
	FMS2	2H
	FMU1	3H
	FMW1	2H
	FMW3	2H

	NAME	L
2SA	2SA1036K	1G
	2SA1532	1G
	2SA1576	1G
	2SA1577	1G
	2SA1610	1G
	2SA1611	1G
	2SA881R	7G
2SB	2SB1009	7G
	2SB1218	1G
	2SB624	1G
	2SB798	1H
2SC	2SC2412K	1G
	2SC3931	1G
	2SC3936	1G
	2SC4081	1G
	2SC4097	1G
	2SC4098	1G
	2SC4099	1G
	2SC4181	1G
	2SC4176	1G
	2SC4177	1G
	2SC4178	1G
2SD	2SD1819	1G
2SJ	2SJ146	2G
2SK	2SK198	3G
	2SK198P,G	3G
	2SK620	2G
	2SK665	2G
3SK	3SK179	4G
	DIODE	
D	DAN202U	1I
	DAP202K	2I
	DAP202U	2I
	DAP209S	6J
	DA204U	6I
E	ERA81-004	4I
F	FMN1	2J
I	IMN10	3J
M	MA141K	5J
	MA141WA	2I
	MA141WK	1I
	MA143	6I
	MA184	5I
	MA185	5I
	MA3075H	1J
	MA704	5I
	MA714	8I
	MA716	7I
R	RB451F	1I
	RD5.6EB2	4J
	RD6.8EB1	4J
	RD6.8EB2	4J
	RD7.5M	1J
	RD7.5M-T1B2	1J
	RD7.5M-T2B2	1J
	RD7.5MB3	1J
	RD8.2EB2	4J
	RD8.2EBS	4J
	RD8.2MB2	1J
	RLZ5.6B	7J
	RLZ8.2B	7J
	1SS133	5I

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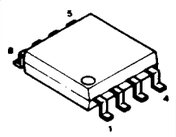
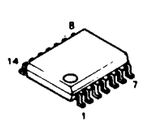
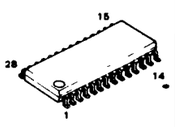
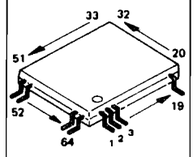
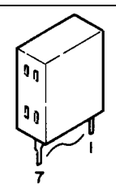
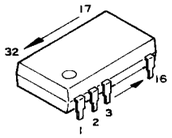
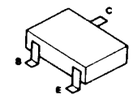
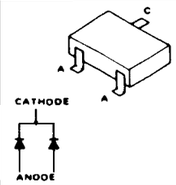
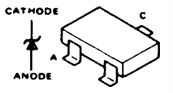
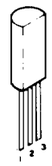
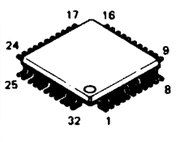
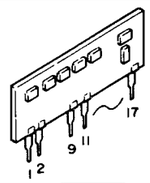
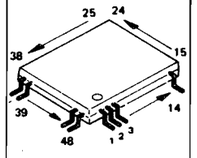
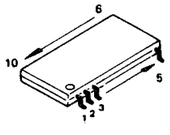
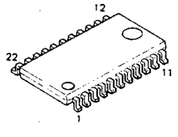
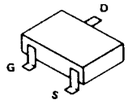
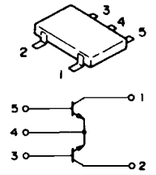
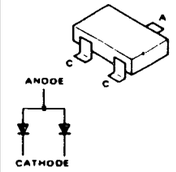
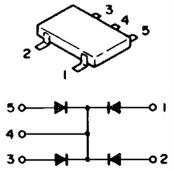
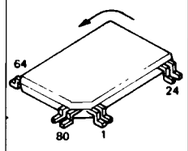
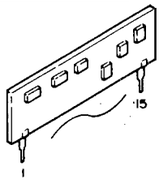
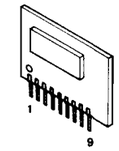
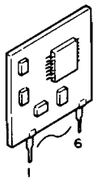
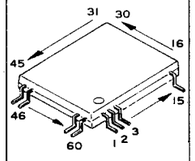
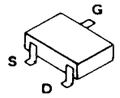
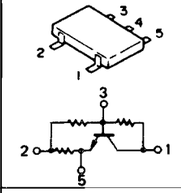
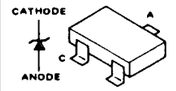
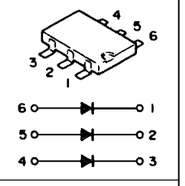
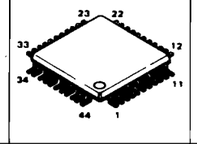
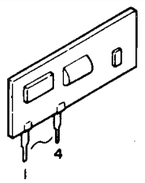
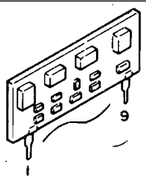
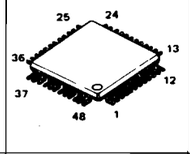
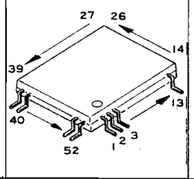
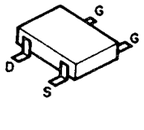
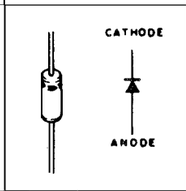
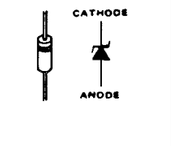
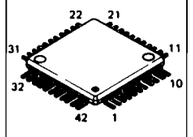
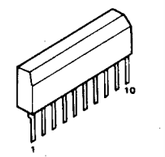
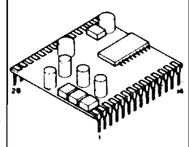
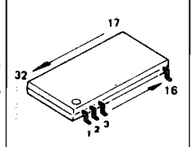
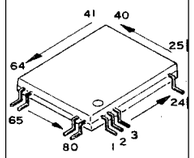
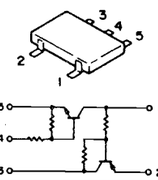
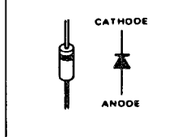
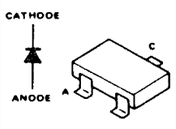
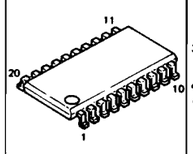
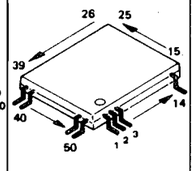
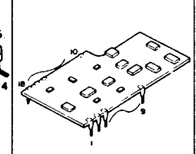
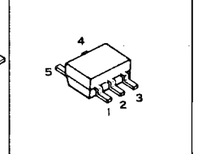
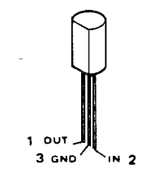
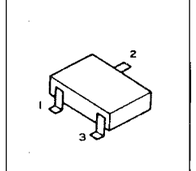
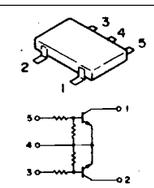
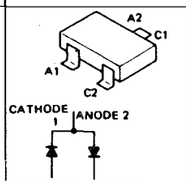
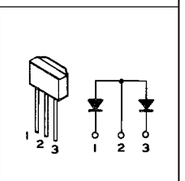
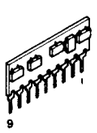
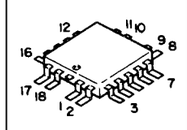
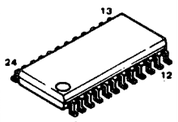
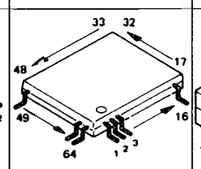
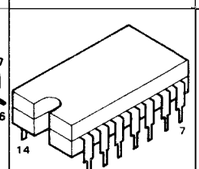
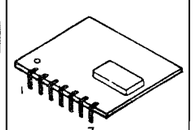
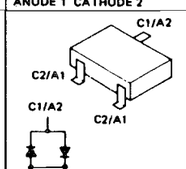
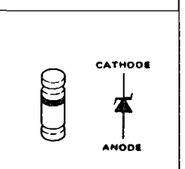
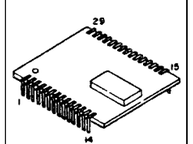
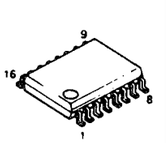
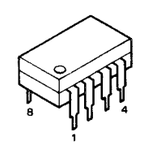
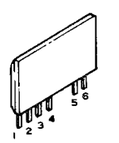
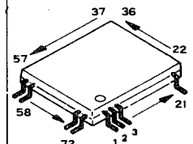
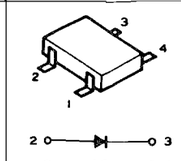
1										
2										
3										
4										
5										
6										
7										
8										

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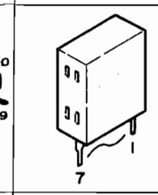
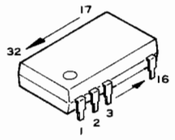
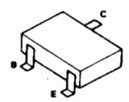
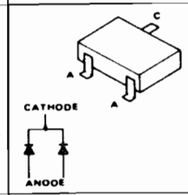
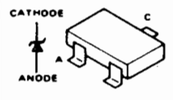
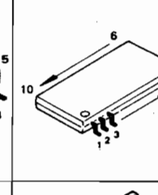
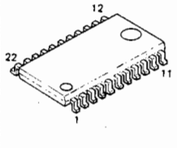
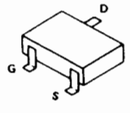
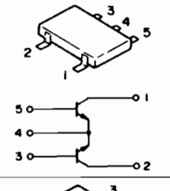
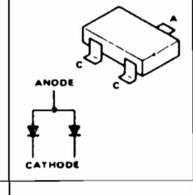
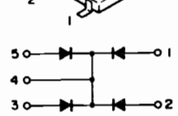
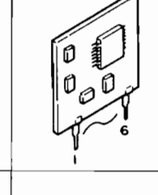
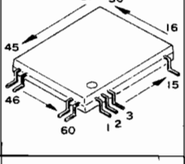
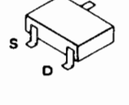
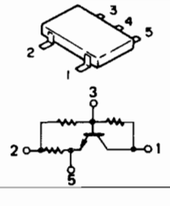
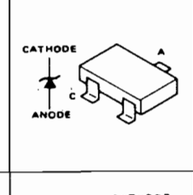
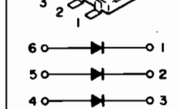
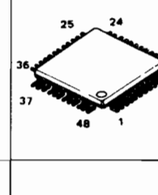
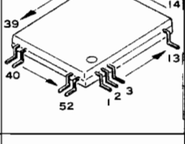
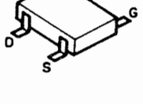
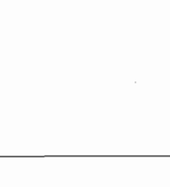
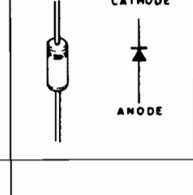
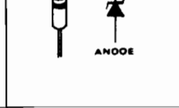
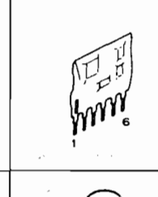
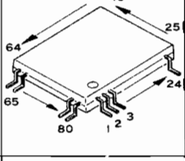
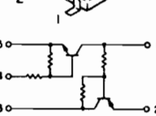
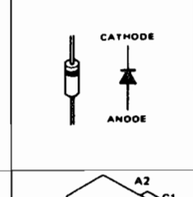
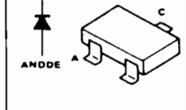
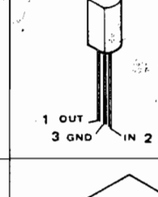
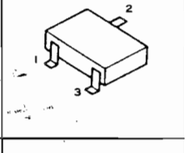
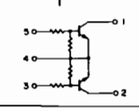
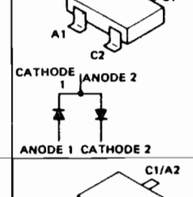
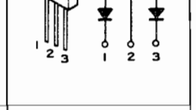
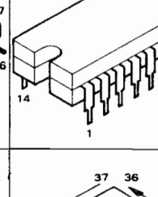
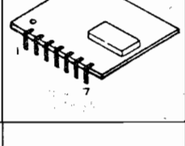
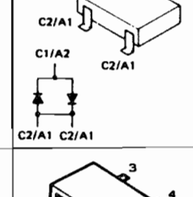
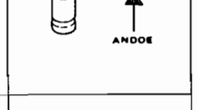
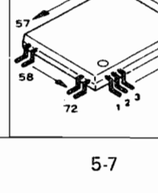
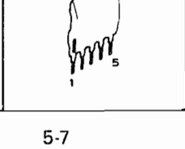
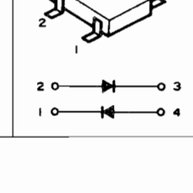
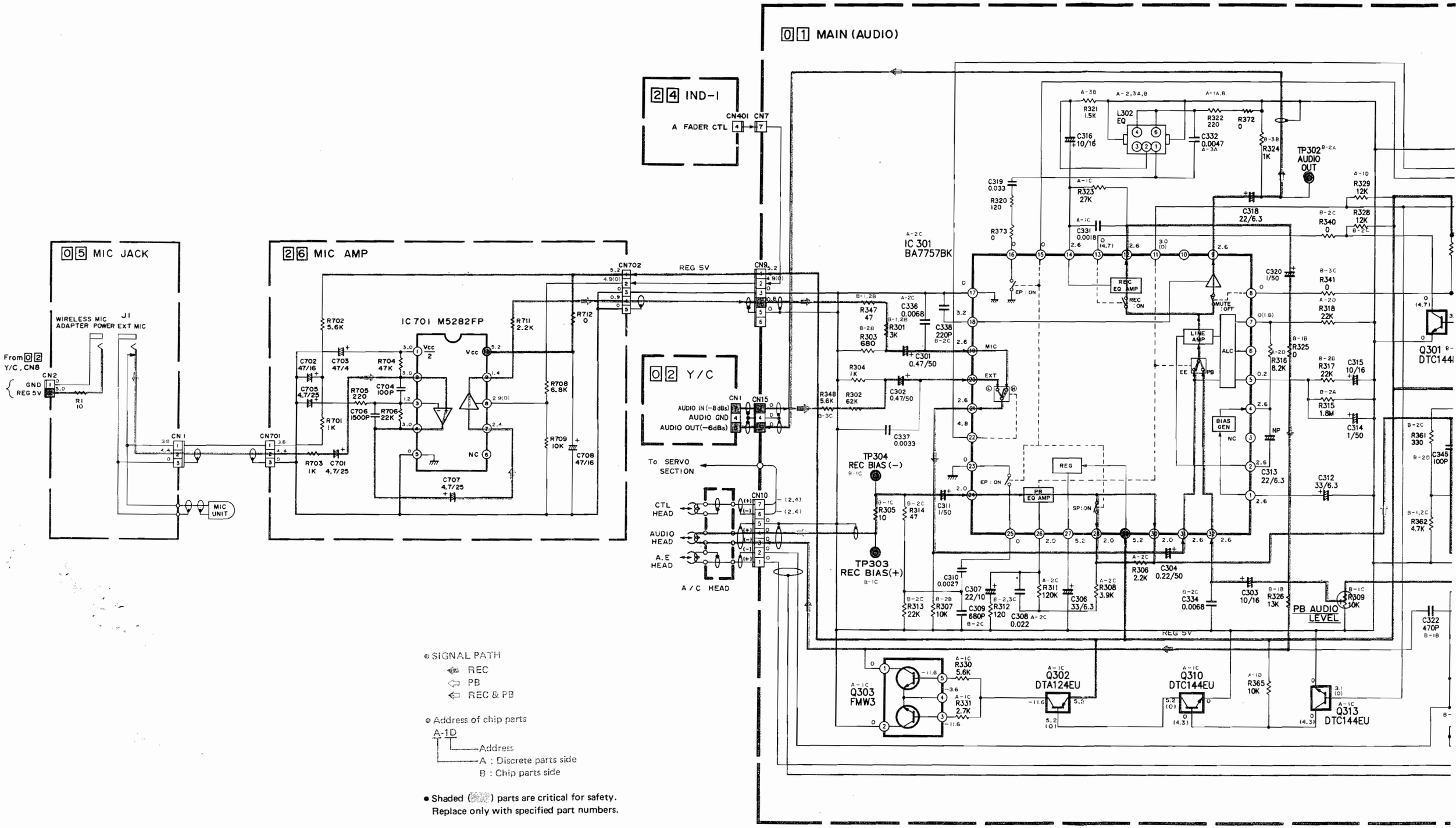
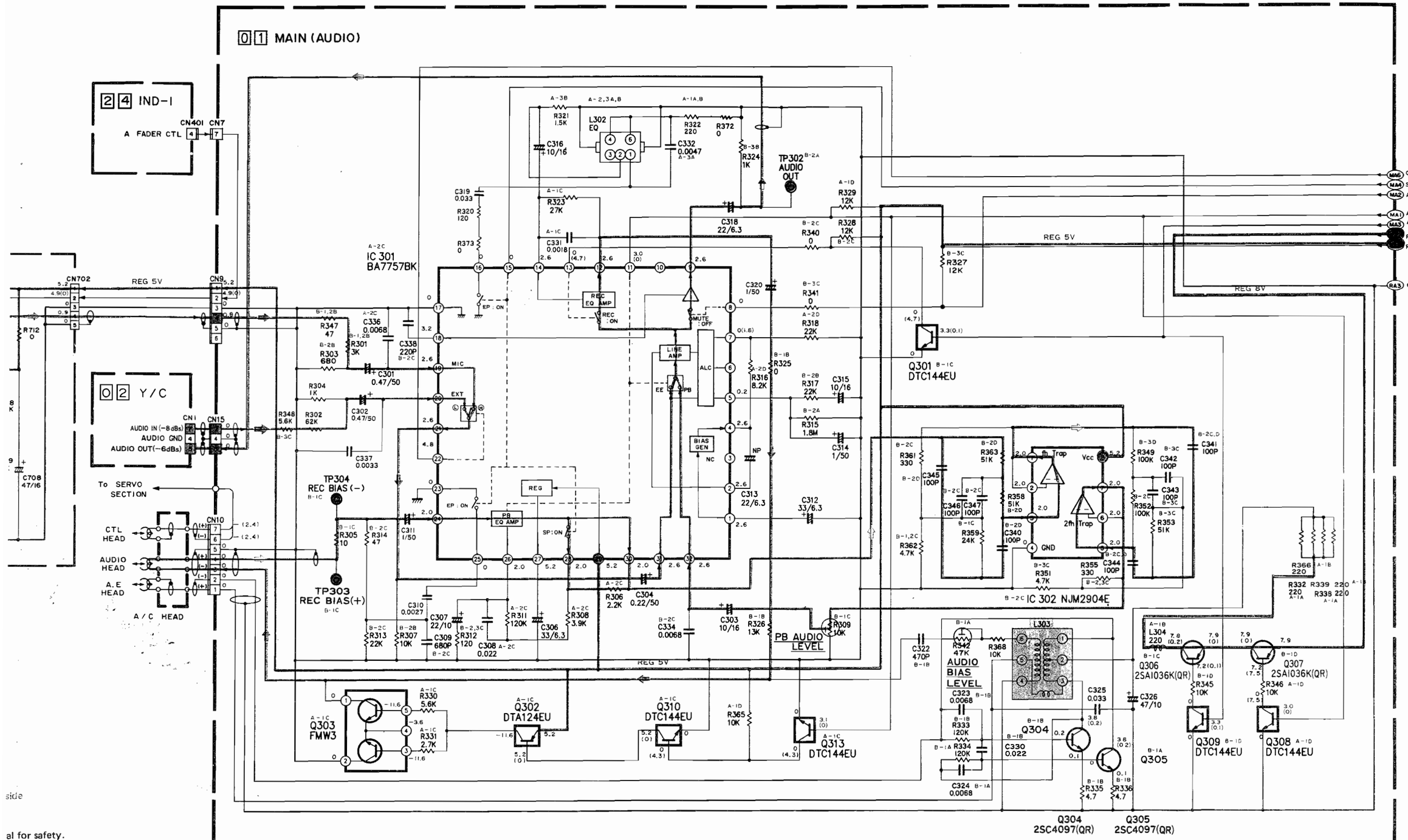
						
						
						
						
						
						
						
						

5-7



- SIGNAL PATH
  - REC
  - PB
  - REC & PB
- Address of chip parts
  - A-1D
    - Address
    - A : Discrete parts side
    - B : Chip parts side
- **Shaded ( ) parts are critical for safety. Replace only with specified part numbers.**
- Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.



side

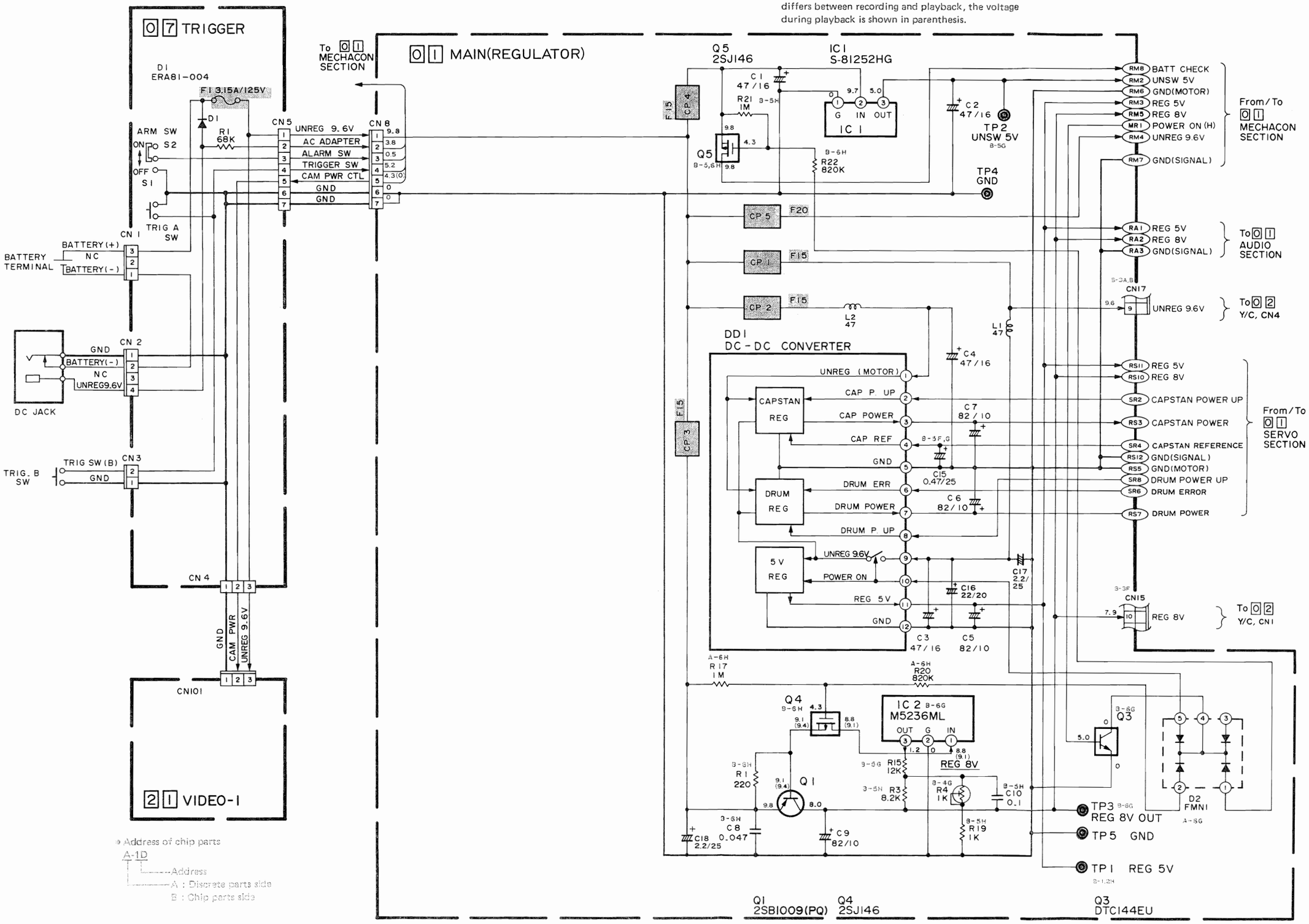
al for safety.
part numbers.

a digital voltmeter during recording
alignment tape. Where voltage
ording and playback, the voltage
shown in parenthesis.

5.7 REGULATOR & TRIGGER SCHEMATIC DIAGRAMS

• Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

• Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

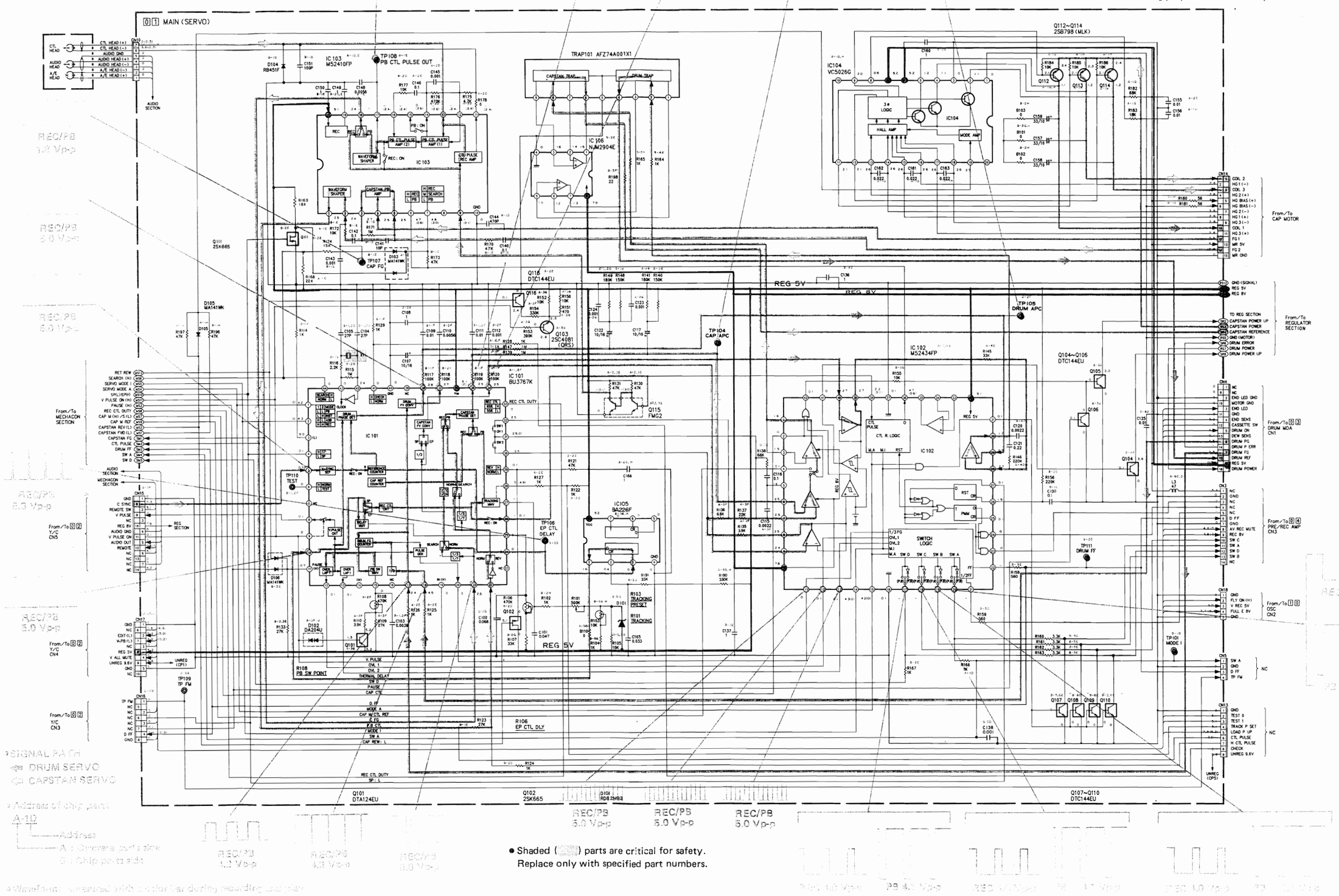


• Address of chip parts
A-1D
Address
A : Discrete parts side
B : Chip parts side

5-9

5.9 SERVO SCHEMATIC DIAGRAM

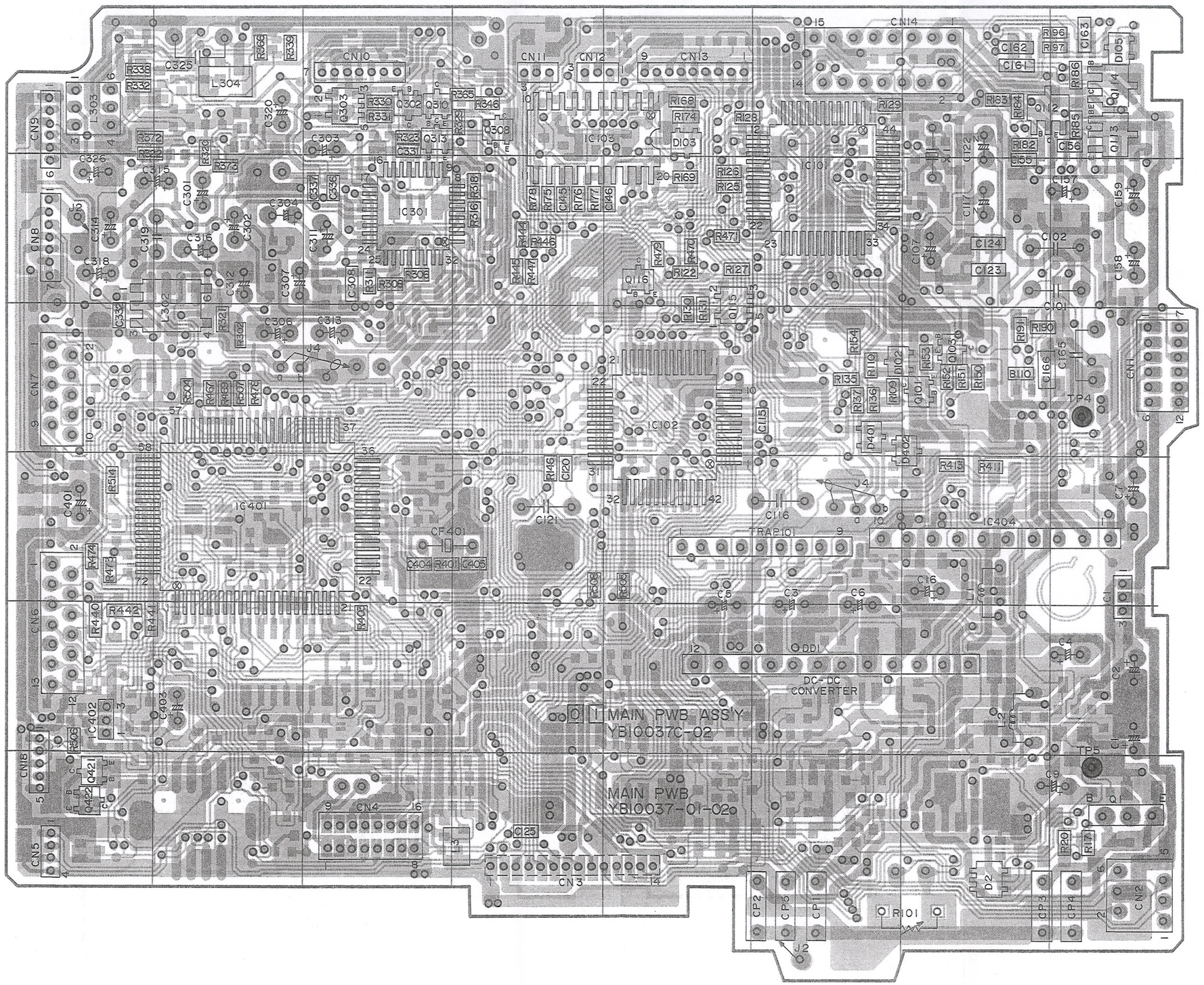
• Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.



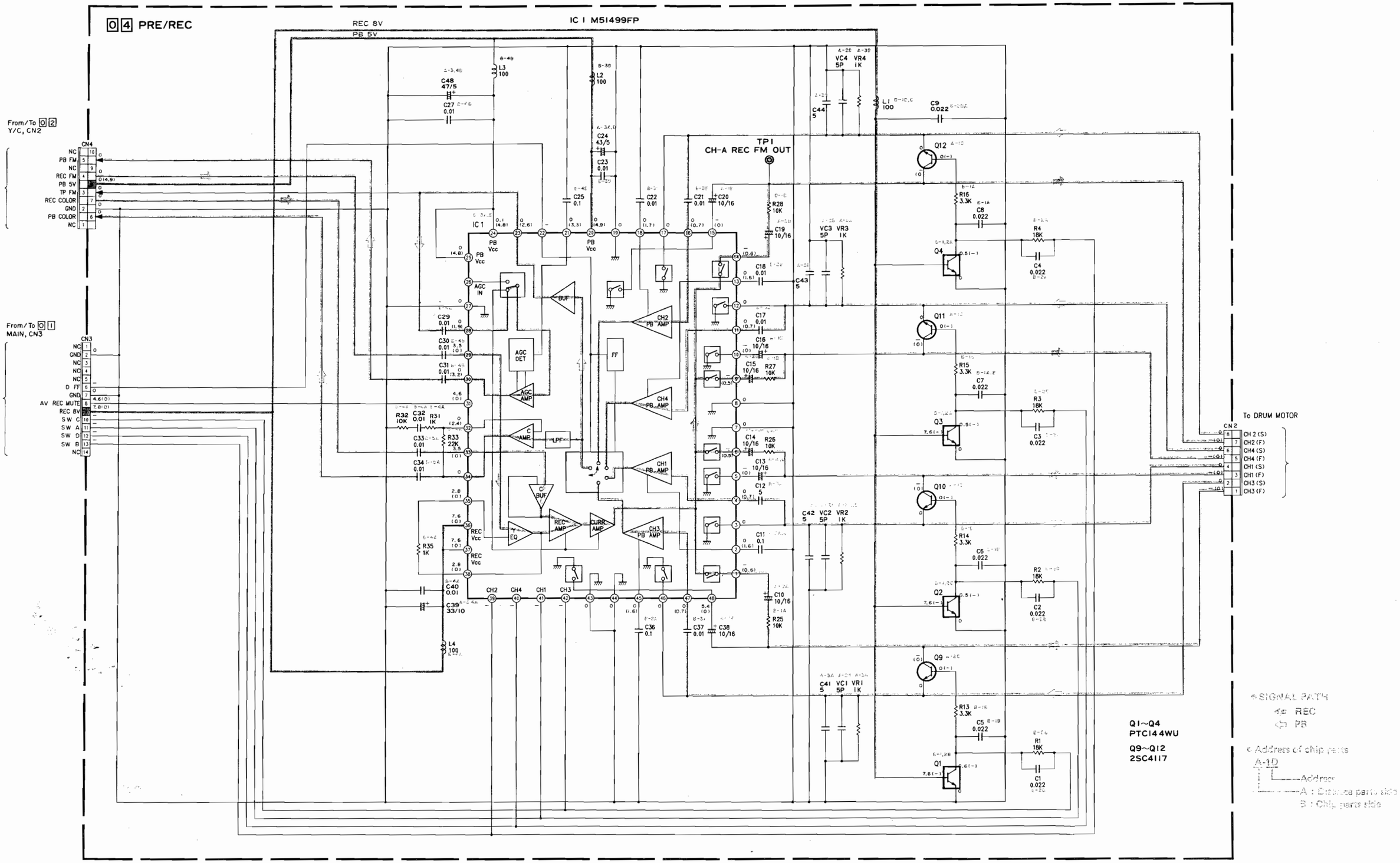
• Shaded (▨) parts are critical for safety.
Replace only with specified part numbers.

5-11

— Front —

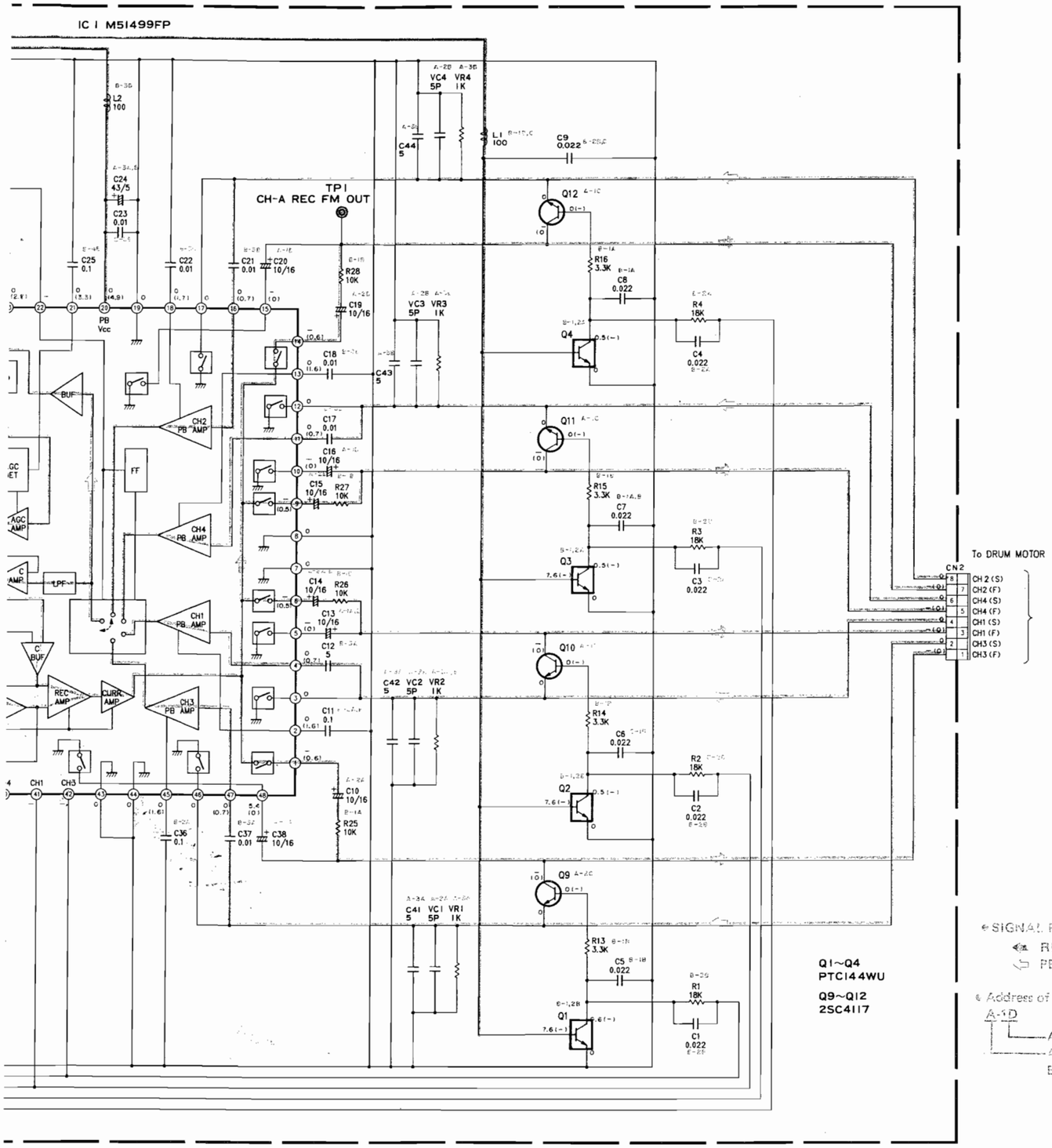

A
B
C
D
E
F
G
H
1
2
3
4
5
6
CN14
CN10
CN11
CN12
CN13
CN9
CN8
CN7
CN6
CN18
CN5
CN4
CN3
CN2
CN1
IC401
IC402
IC102
IC103
IC404
TRAP101
DDI
DC-DC CONVERTER
MAIN PWB ASS'Y
YB10037C-02
MAIN PWB
YB10037-01-02
TP4
TP5
J2
J4
R101
L304
L305
L302
CF401

5.12 PRE/REC AMP SCHEMATIC DIAGRAM



Note: This schematic diagram is only for reference.
Avoid replacing indicidual parts.
Replace the entire unit only.

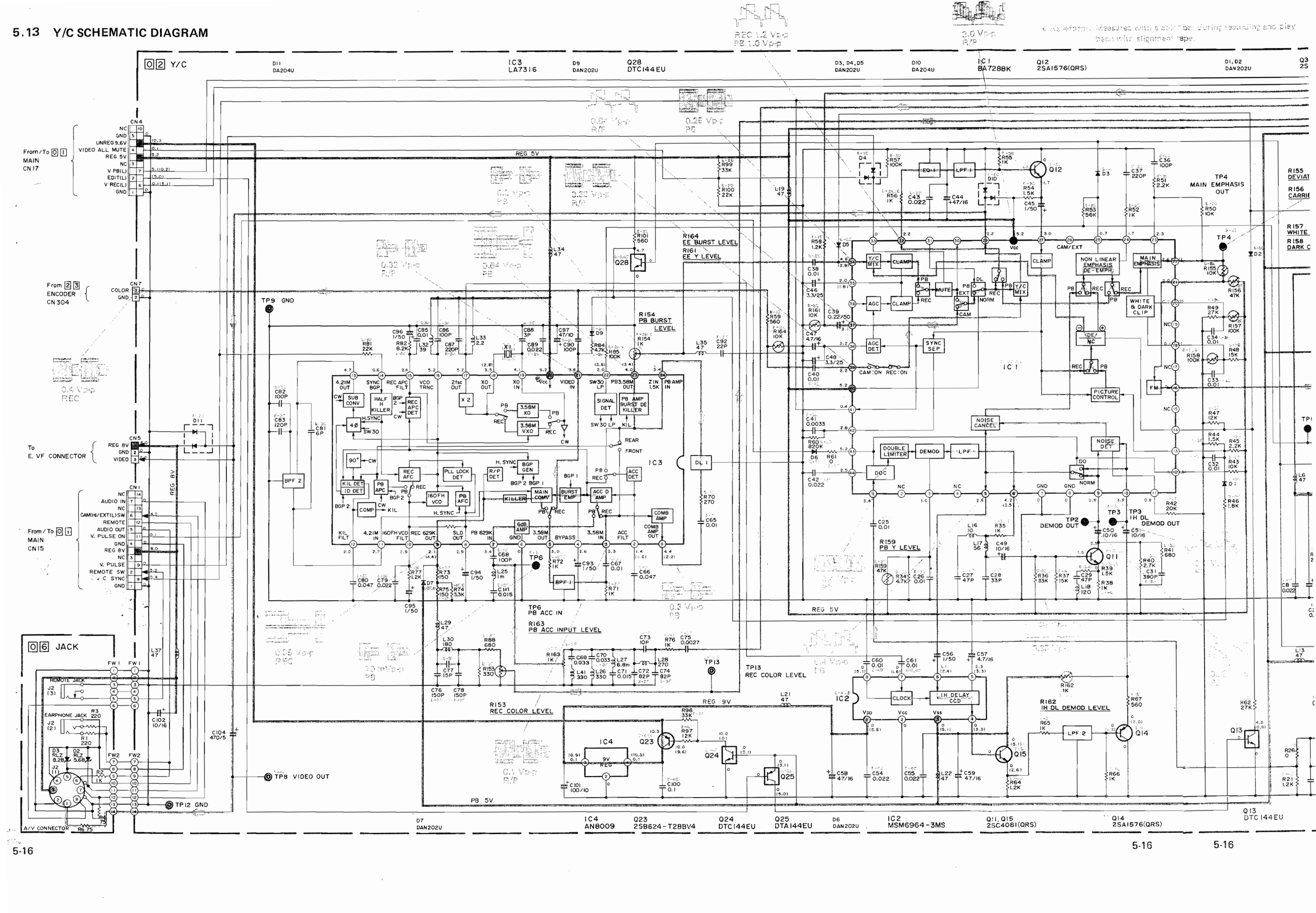
* Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.



Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

ence.

5.13 Y/C SCHEMATIC DIAGRAM



5-16 5-16 5-16

• Waveform: Measured with a color bar during recording and play back with alignment tape.

• Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

REC 1.2 Vp-p
PB 1.0 Vp-p

2.0 Vp-p
R/P

'316 | D9 DAN202U | Q28 DTC144EU | D3, D4, D5 DAN202U | D10 DA204U | IC1 BA7288K | Q12 2SA1576(QRS) | D1, D2 DAN202U | Q30 2SC4081(QRS) | Q20 ~ Q22 2SA1577 | Q26 2SK665

0.64 Vp-p R/P

0.25 Vp-p PB

0.32 Vp-p R/P

R164 EE BURST LEVEL
R161 EE Y LEVEL

R154 PB BURST LEVEL

R163 PB ACC INPUT LEVEL

R155 DEVIATION
R156 CARRIER

R157 WHITE CLIP LEVEL
R158 DARK CLIP LEVEL

R159 PB Y LEVEL

R162 1H DL DEMOD LEVEL

R152 PB RF EQ

R151 REC FM LEVEL

TP13 REC COLOR LEVEL

TP4 MAIN EMPHASIS OUT

TP1 MOD OUT

TP2 DEMOD OUT

TP3 1H DL DEMOD OUT

TP6 PB ACC IN

TP7 PB FM OUT

TP10 DRUM FF IN

TP11 GND

REG 5V

REG 9V

0.3 Vp-p PB

0.1 Vp-p REC

0.4 Vp-p PB

1.4 Vp-p REC

0.84 Vp-p REC

1.0 Vp-p REC

4.0 Vp-p PB

0.2 Vp-p PB

0.35 Vp-p PB

0.28 Vp-p PB

CN2
1 NC
2 PB COLOR
3 GND
4 REC COLOR
5 TP FM
6 PB 5V
7 REC FM
8 NC
9 PB FM
10 SP(L)/EP(H)
From / To 04 PRE/REC AMP CN4

CN6
1 Y
2 GND
From 23 ENCODER CN304

CN8
1 GND
2 REG 5V
To 05 MIC JACK CN2

CN3
1 TP FM
2 NC
3 NC
4 SP(L)/EP(H)
5 NC
6 NC
7 D FF
8 GND
From / To 01 MAIN CN16

IC1 BLOCKS: Y/C MIX, CLAMP, AGC, AGC DET, SYNC SEP, CAM/ON REC/ON, VIDEO IN, SW30 LP, PB3.58M OUT, ZIN 1.5K, PB AMP IN, SIGNAL DET, PB AMP BURST DE KILLER, ACC DET, BURST EMP, ACC D AMP, COMB AMP, ACC FILT, BYPASS, 3.58M IN, 3.58M OUT, MUTE, NON LINEAR EMPHASIS (DE-EMPH), MAIN EMPHASIS, WHITE & DARK CLIP, VDET, PICTURE CONTROL, NOISE CANCEL, DOUBLE LIMITER, DEMOD, LPF, DOC, NOISE DET, FM, NORM

IC2 MSM6964-3MS: CLOCK, 1H DELAY CCD, Vdd, Vcc, Vss

IC3

IC4 AN8009: 9V REG

Q1, Q2, Q6 2SC4081(QRS)
Q4 2SA1576
Q5 2SC4081
Q7 DTC144EU
Q11, Q15 2SC4081(QRS)
Q13 DTC144EU
Q14 2SA1576(QRS)
Q23 2SB624-T2BBV4
Q24 DTC144EU
Q25 DTA144EU
D6 DAN202U

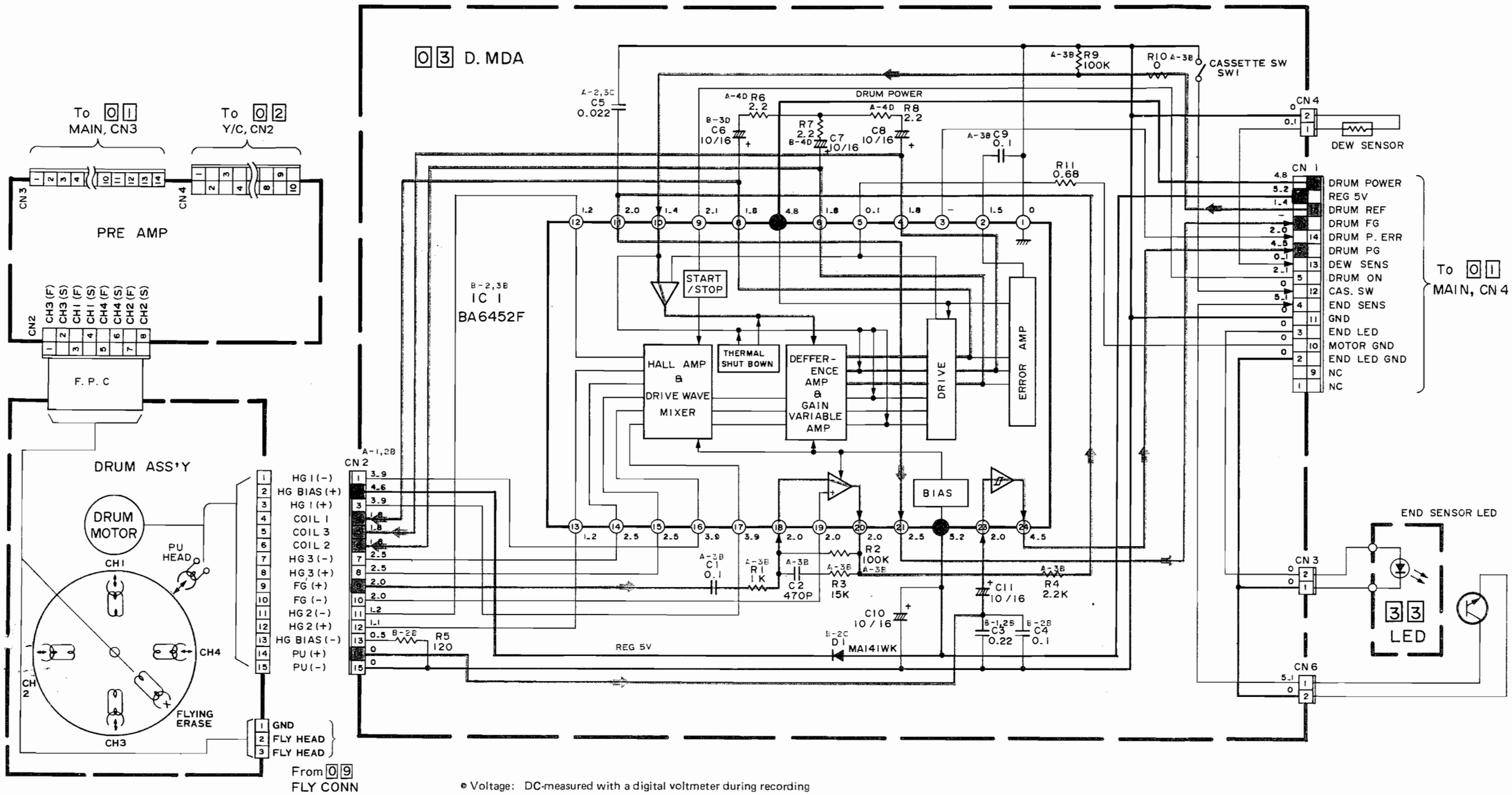
5-16 5-16

• Address of chip parts
A-12
A : Address
A : Discrete parts side
B : Chip parts side

• SIGNAL PATH
REC
PB
REC & PB

• Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

5.15 DRUM MDA SCHEMATIC DIAGRAM



● Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

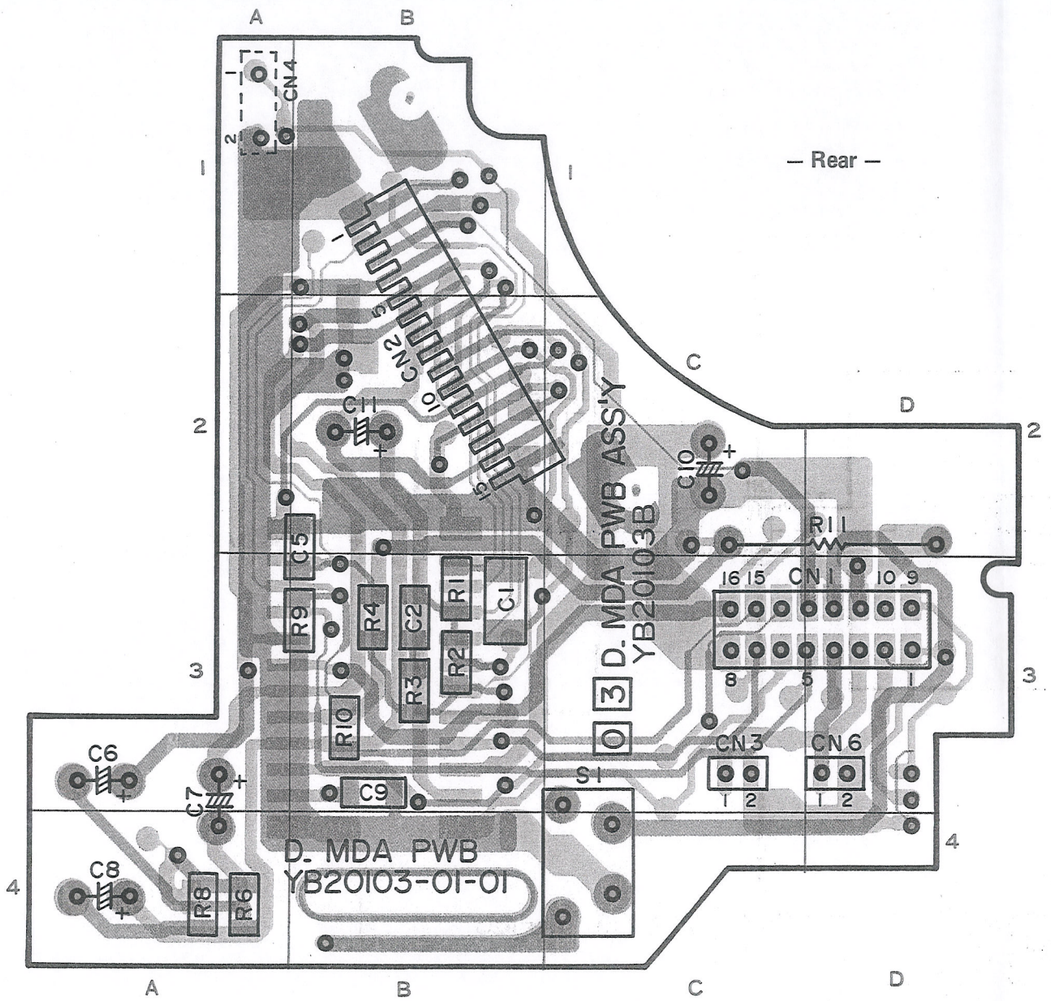
● Address of chip parts

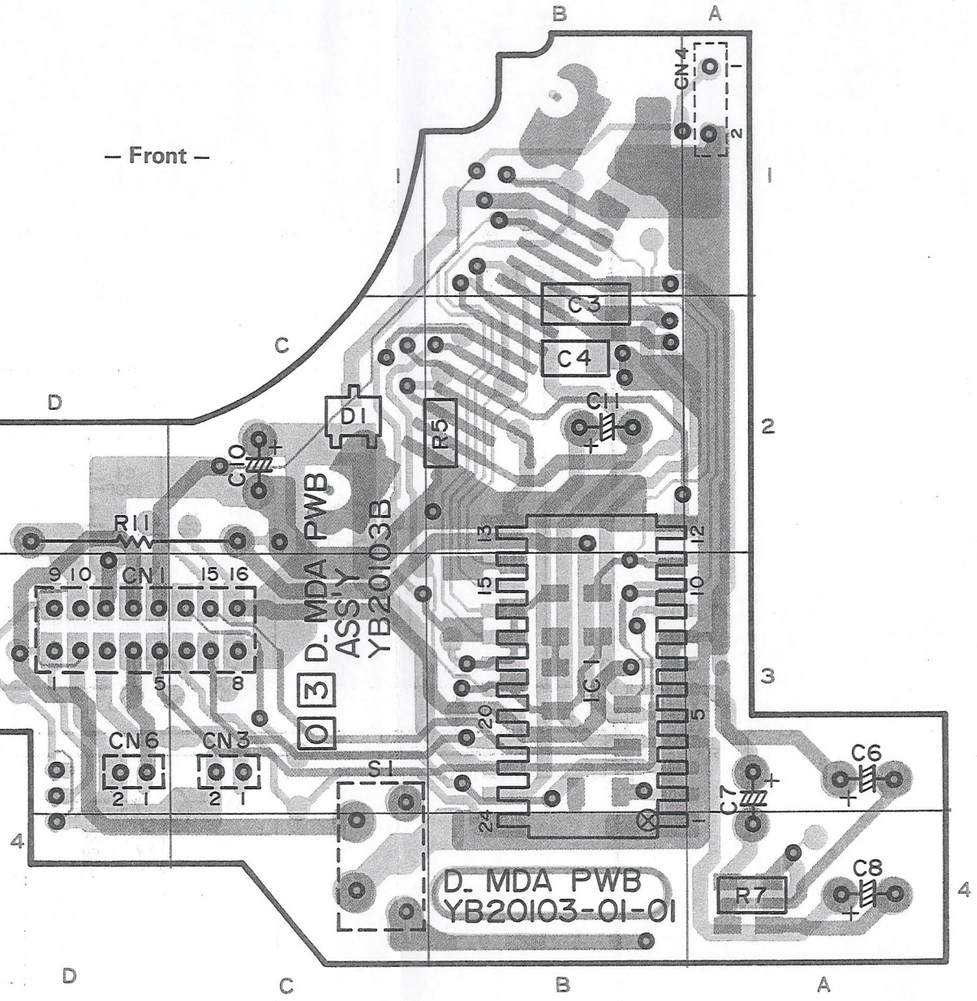
A-1D
- Address
- A : Discrete parts side
- B : Chip parts side

⇐ DRUM SERVO SIGNAL PATH

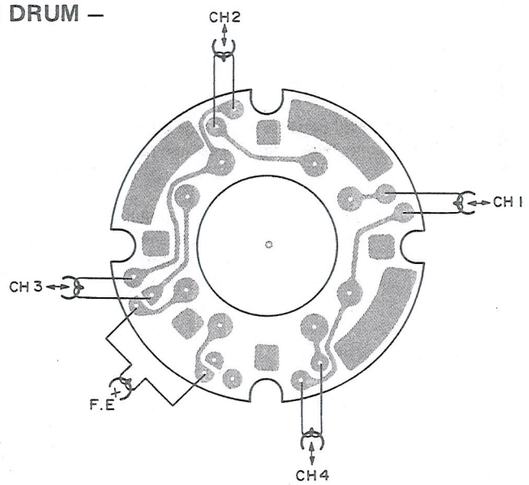
5-18

5.16 DRUM MDA & UPPER DRUM CIRCUIT BOARDS



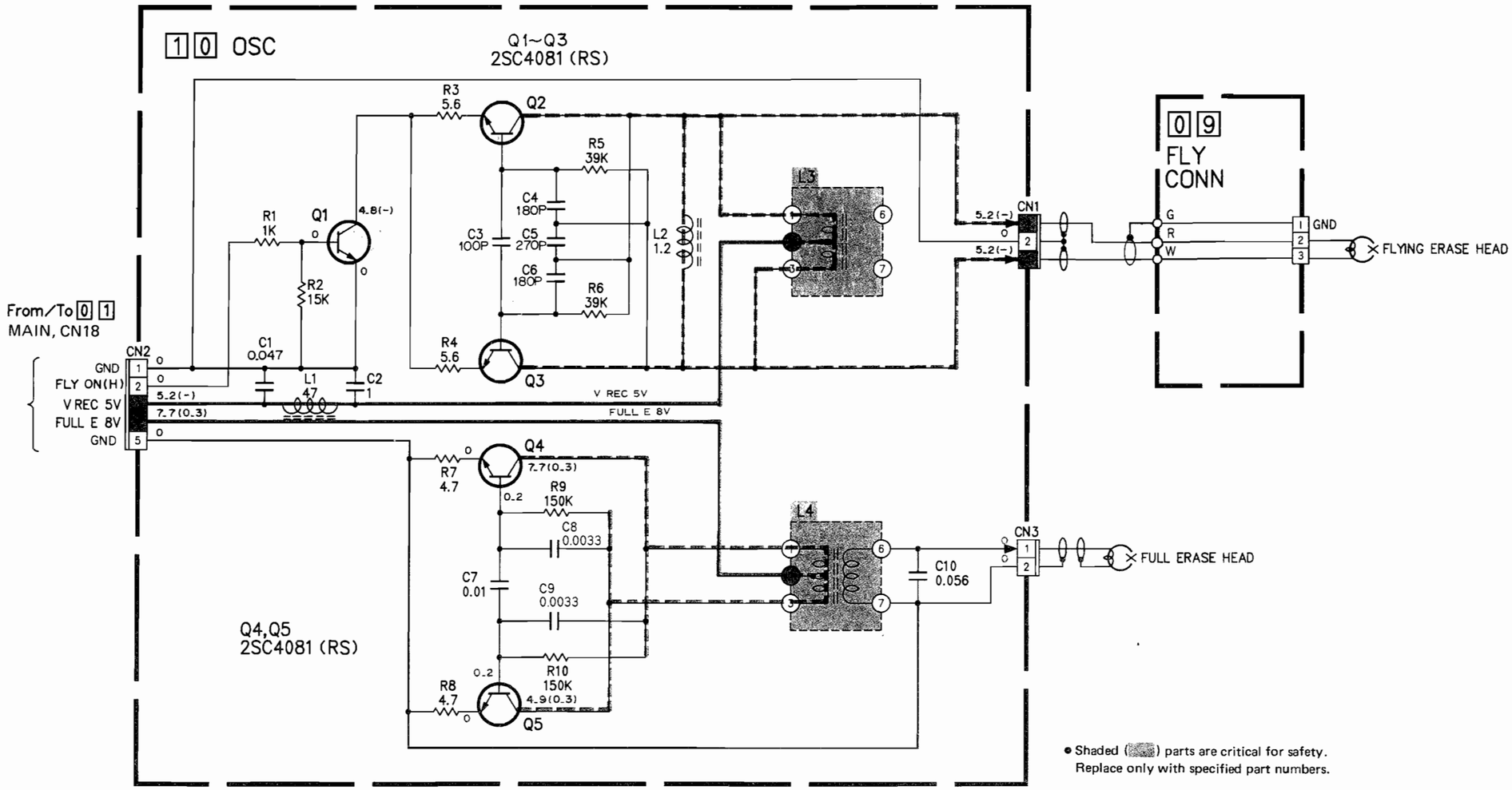


— UPPER DRUM —



3 1 UPPER DRUM PWB
YDM3021-2

5-19



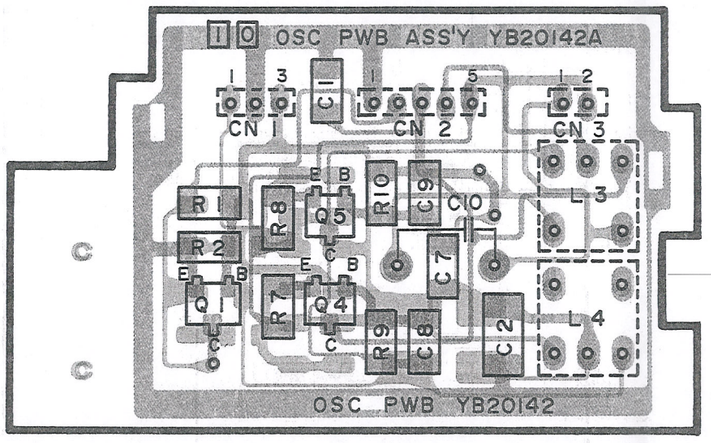
● Shaded (▒) parts are critical for safety.
Replace only with specified part numbers.

© Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

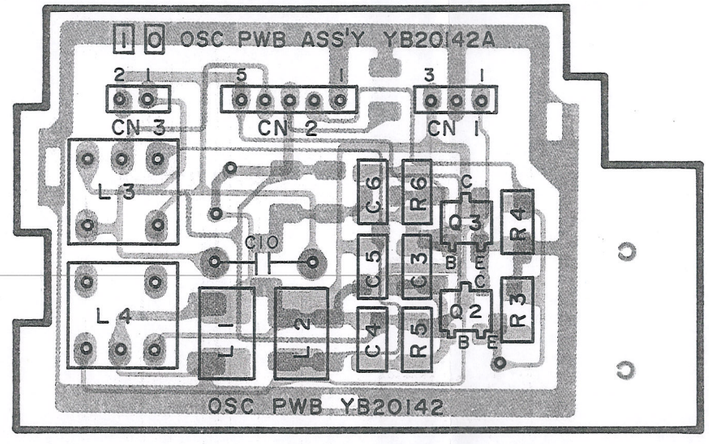
5-20

— OSC —

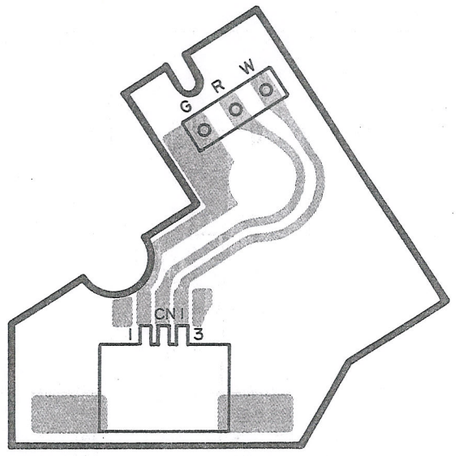
— Rear —



— Front —



— FLY CONN —

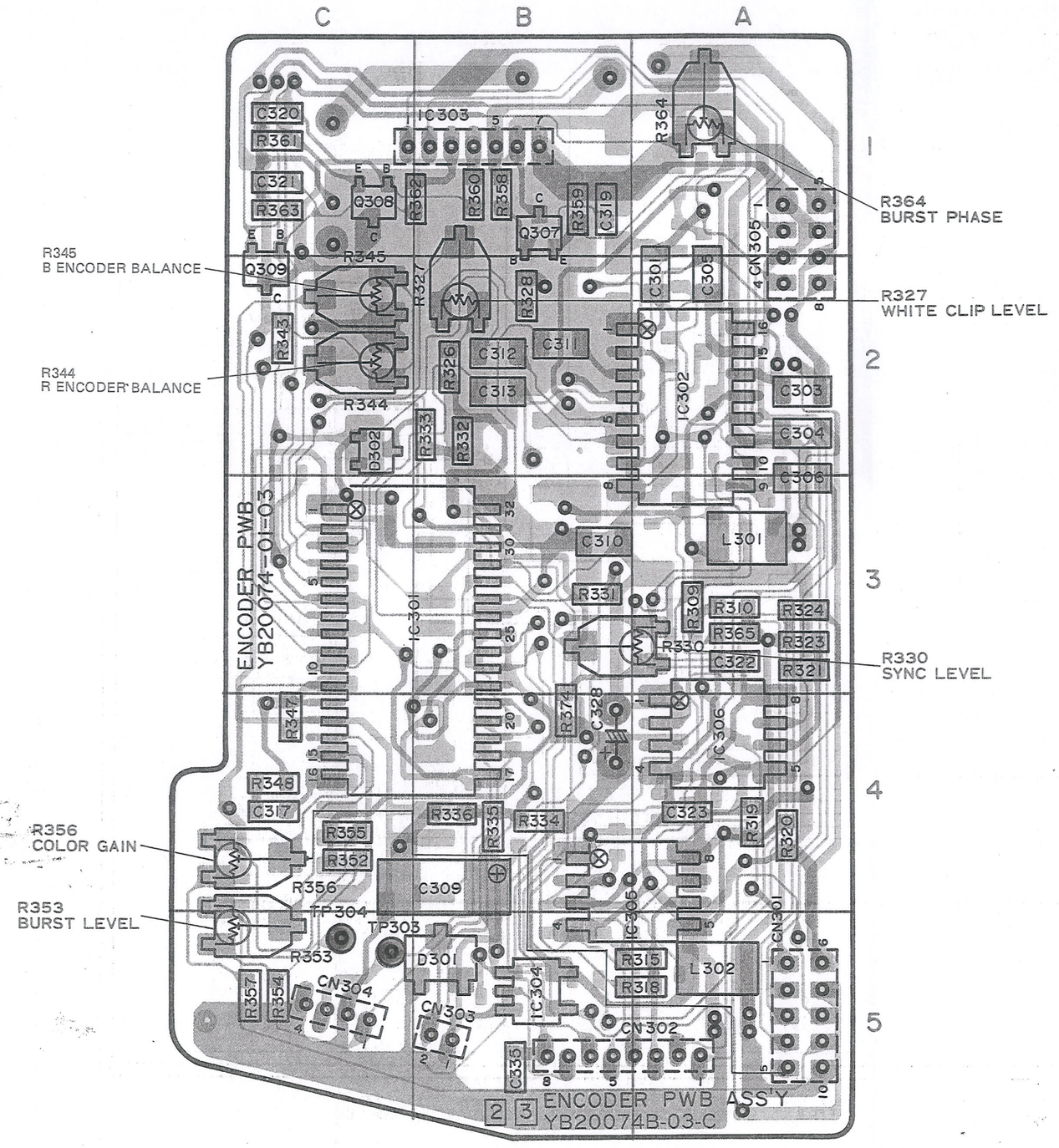


O9 FLY CONN PWB
YB30047

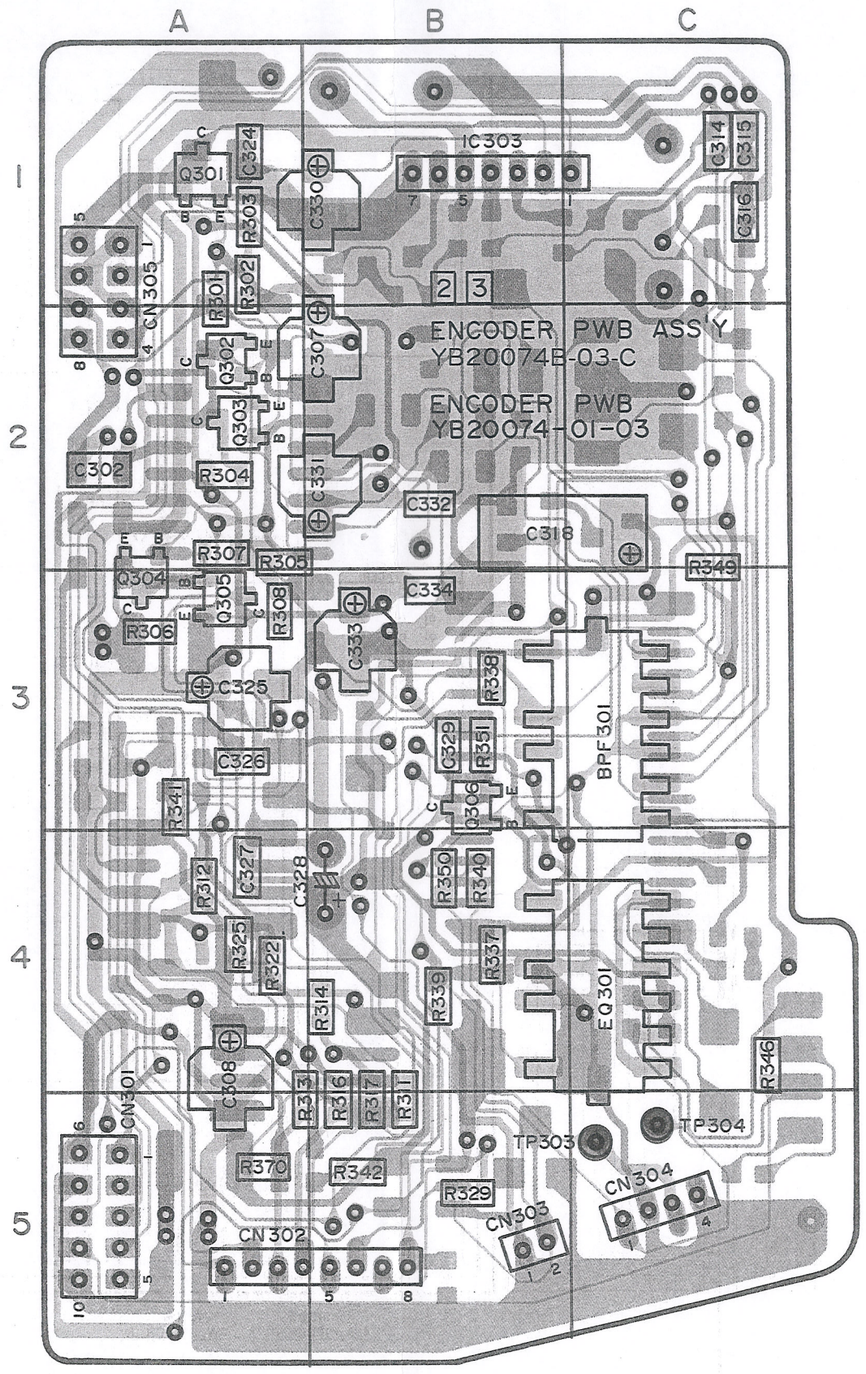
5-21

5.20 ENCODER CIRCUIT BOARD

— Rear —

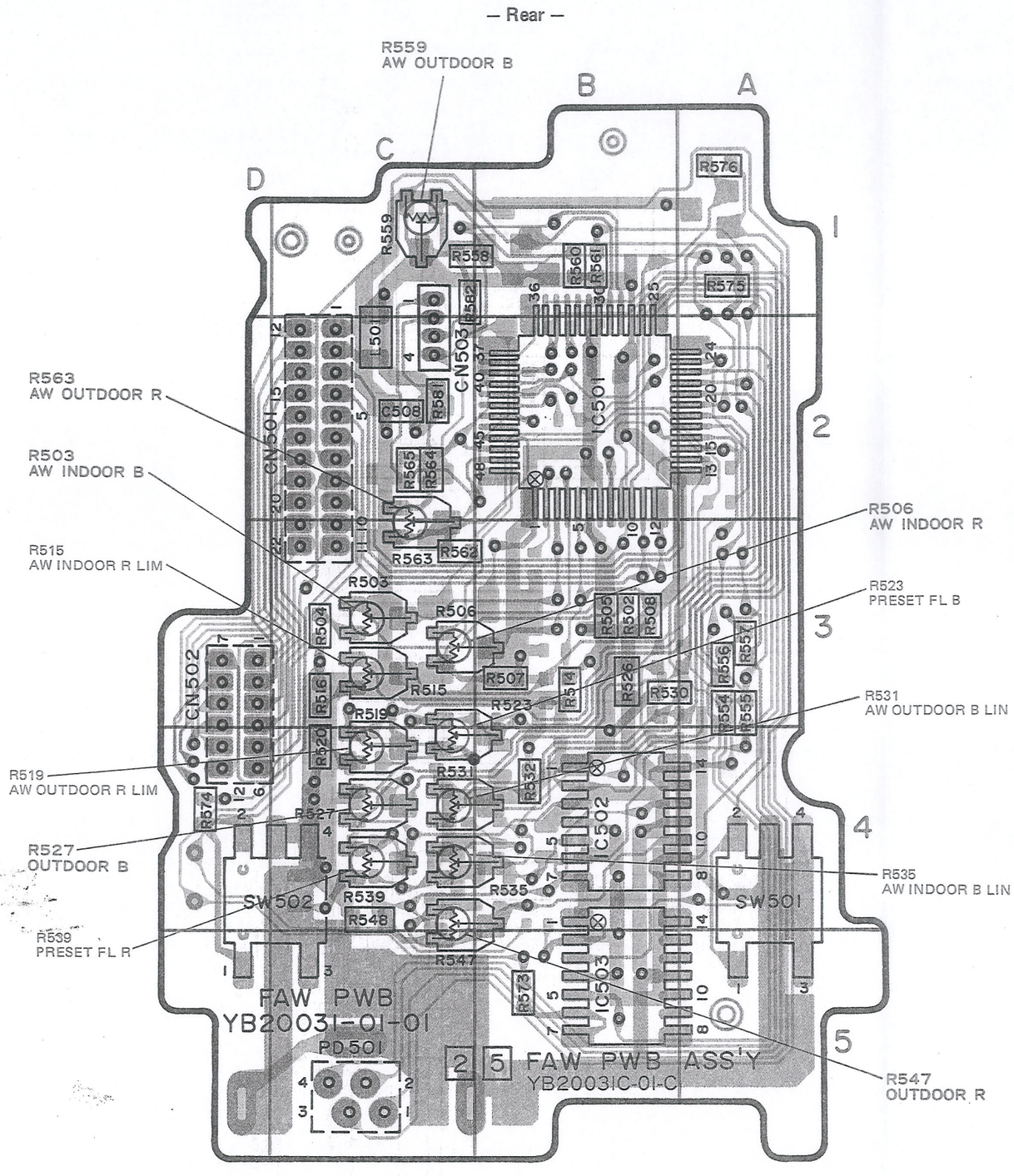


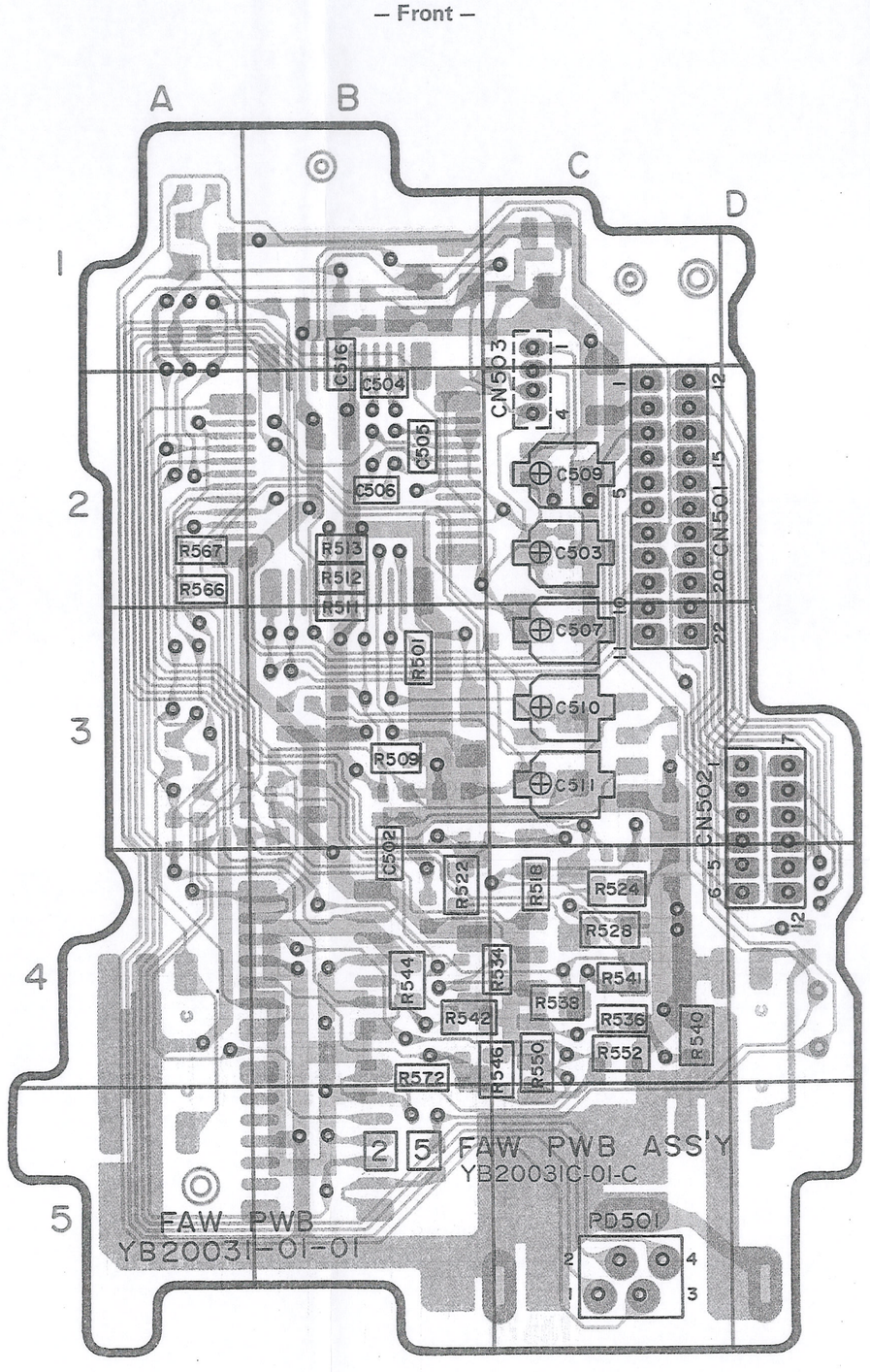
— Front —



5-23

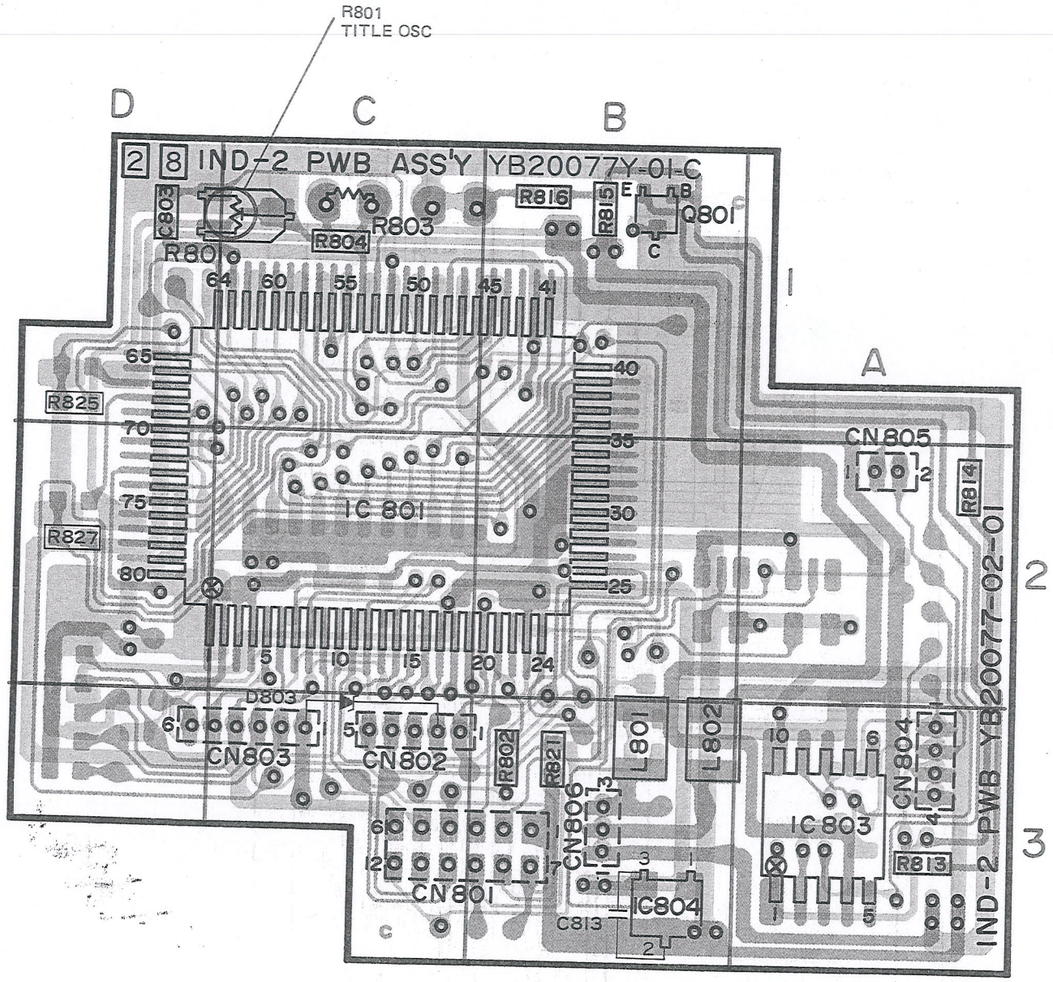
5.22 FAW CIRCUIT BOARD



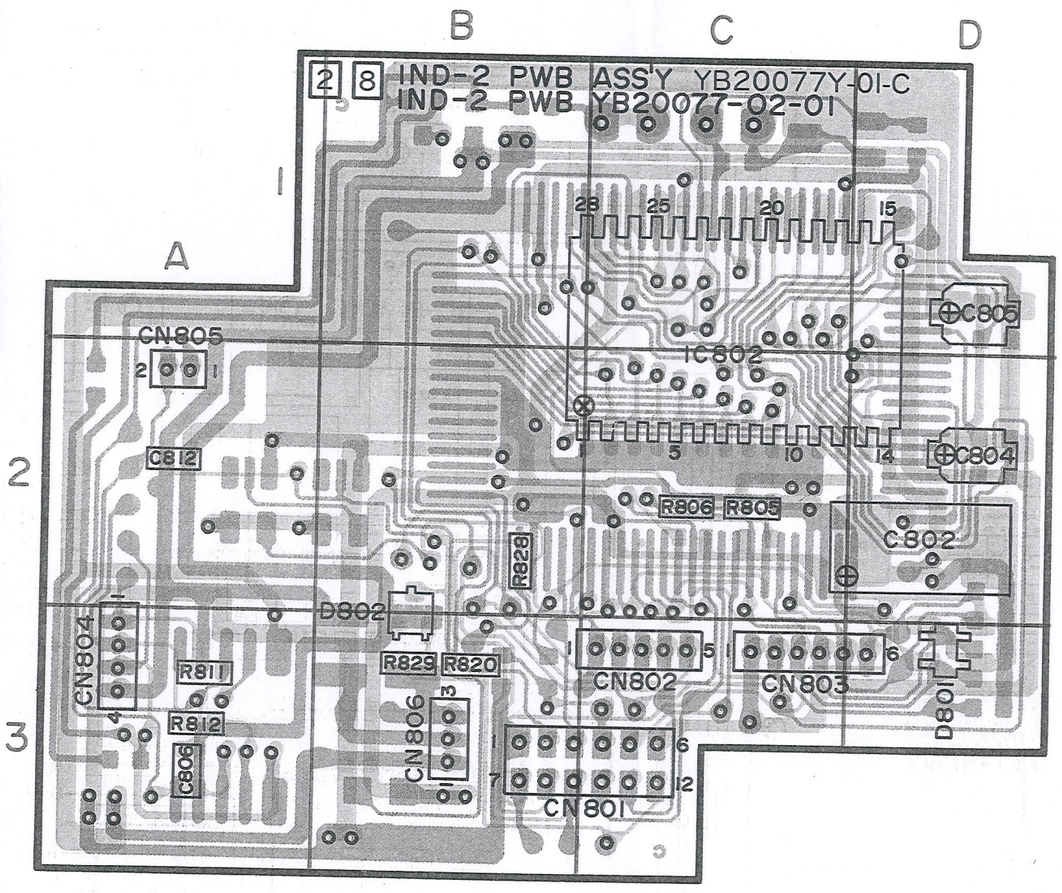


5-25

— Rear —



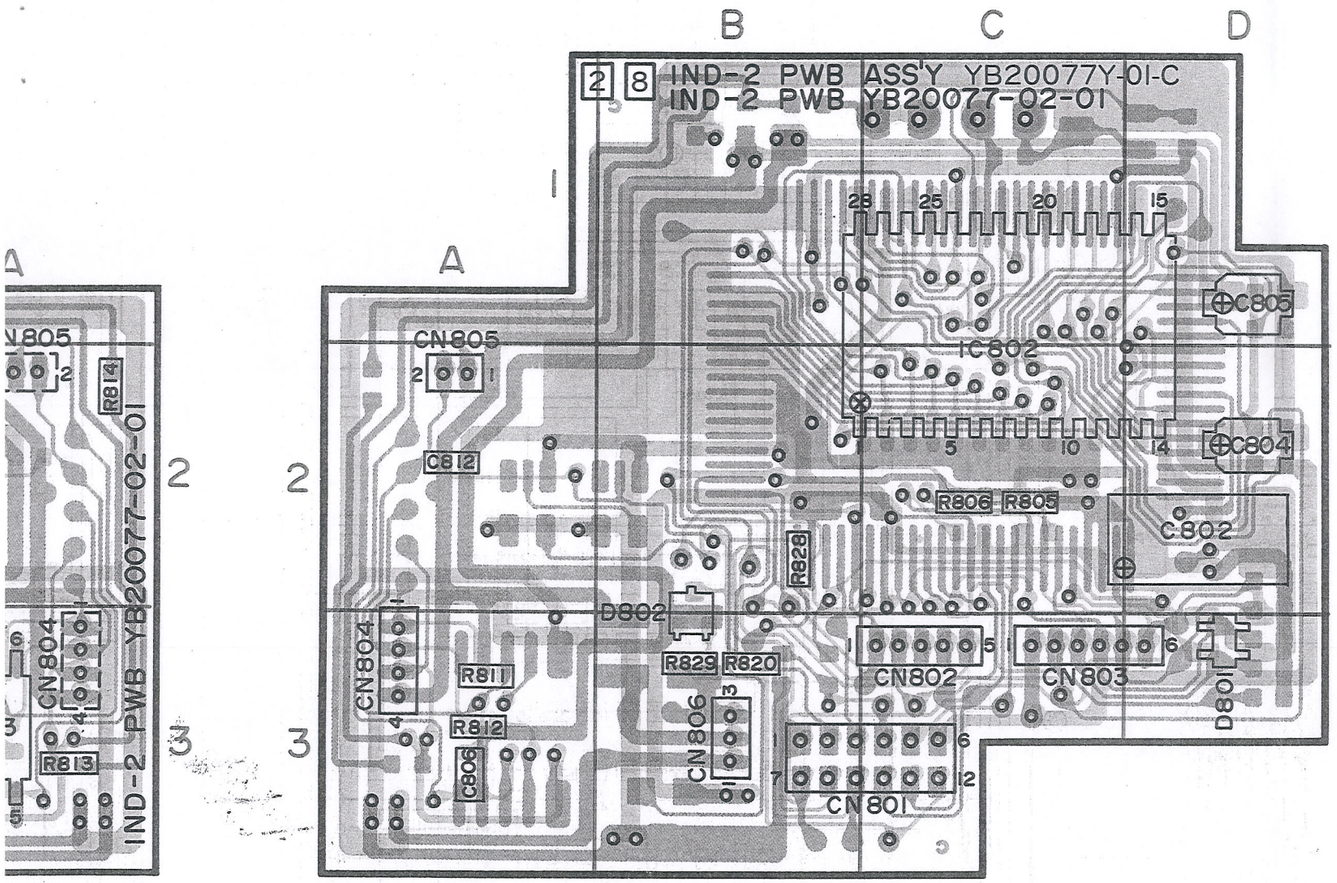
— Front —

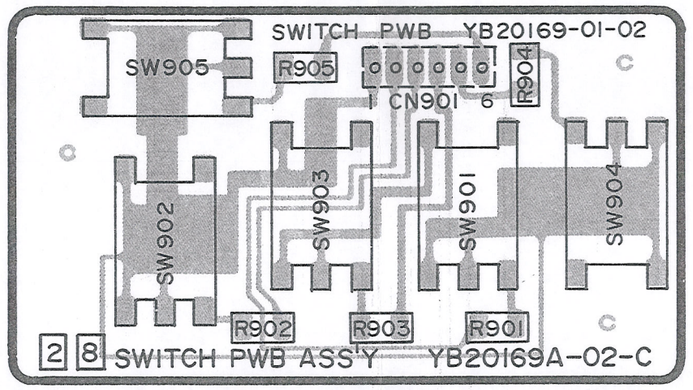


5-27

5.25 SWITCH CIRCUIT BOARD

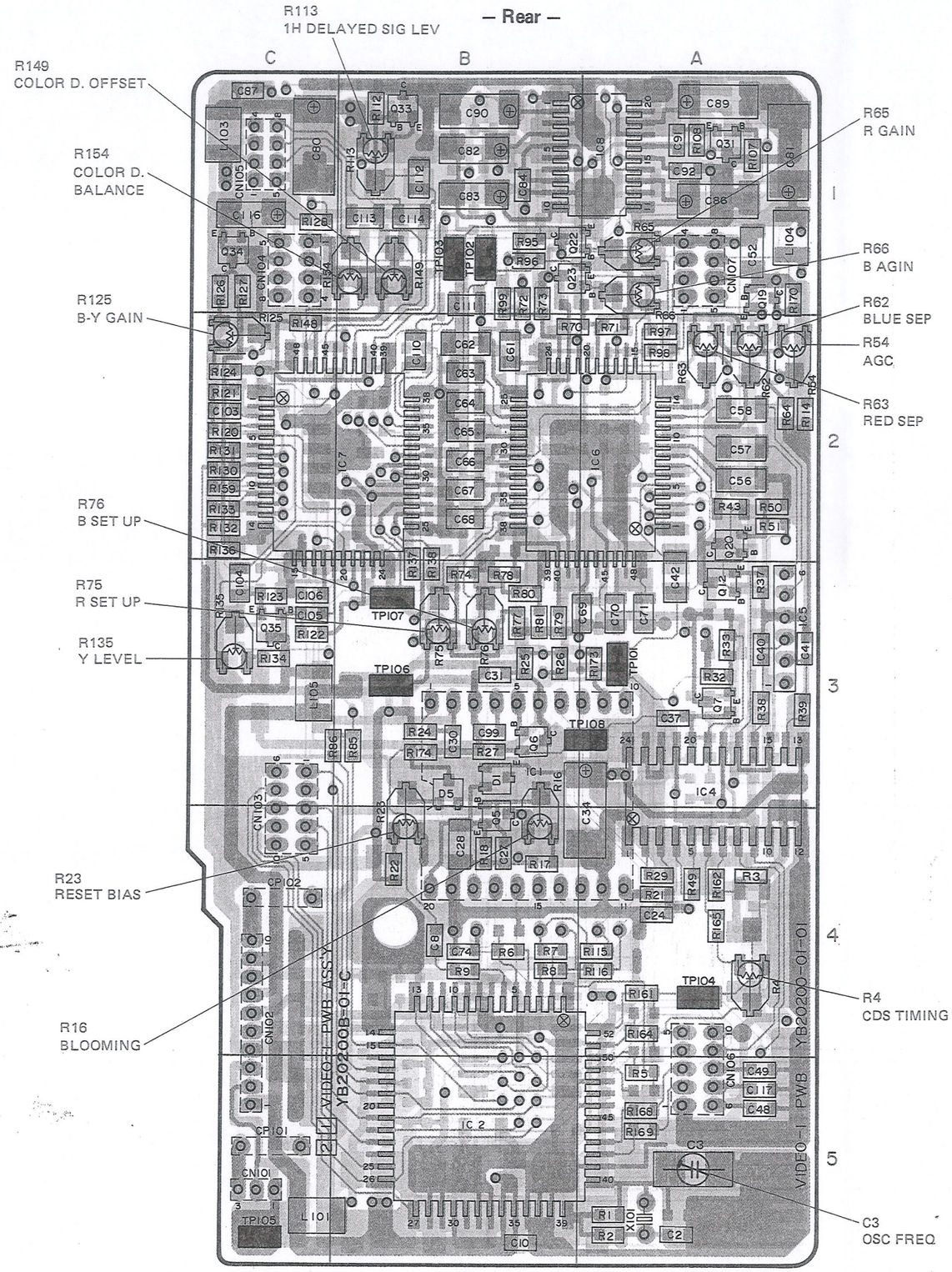
— Front —

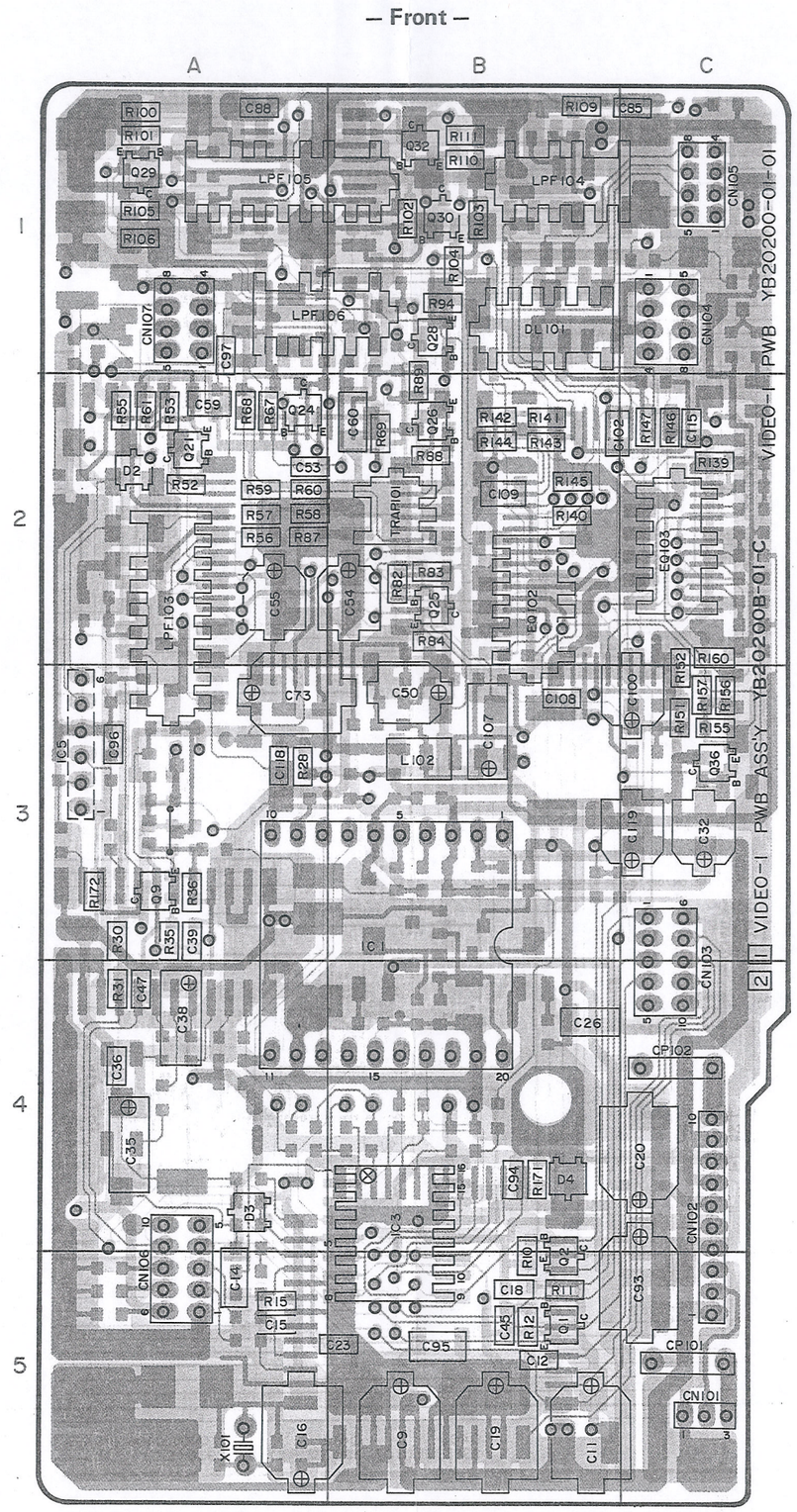




5-27

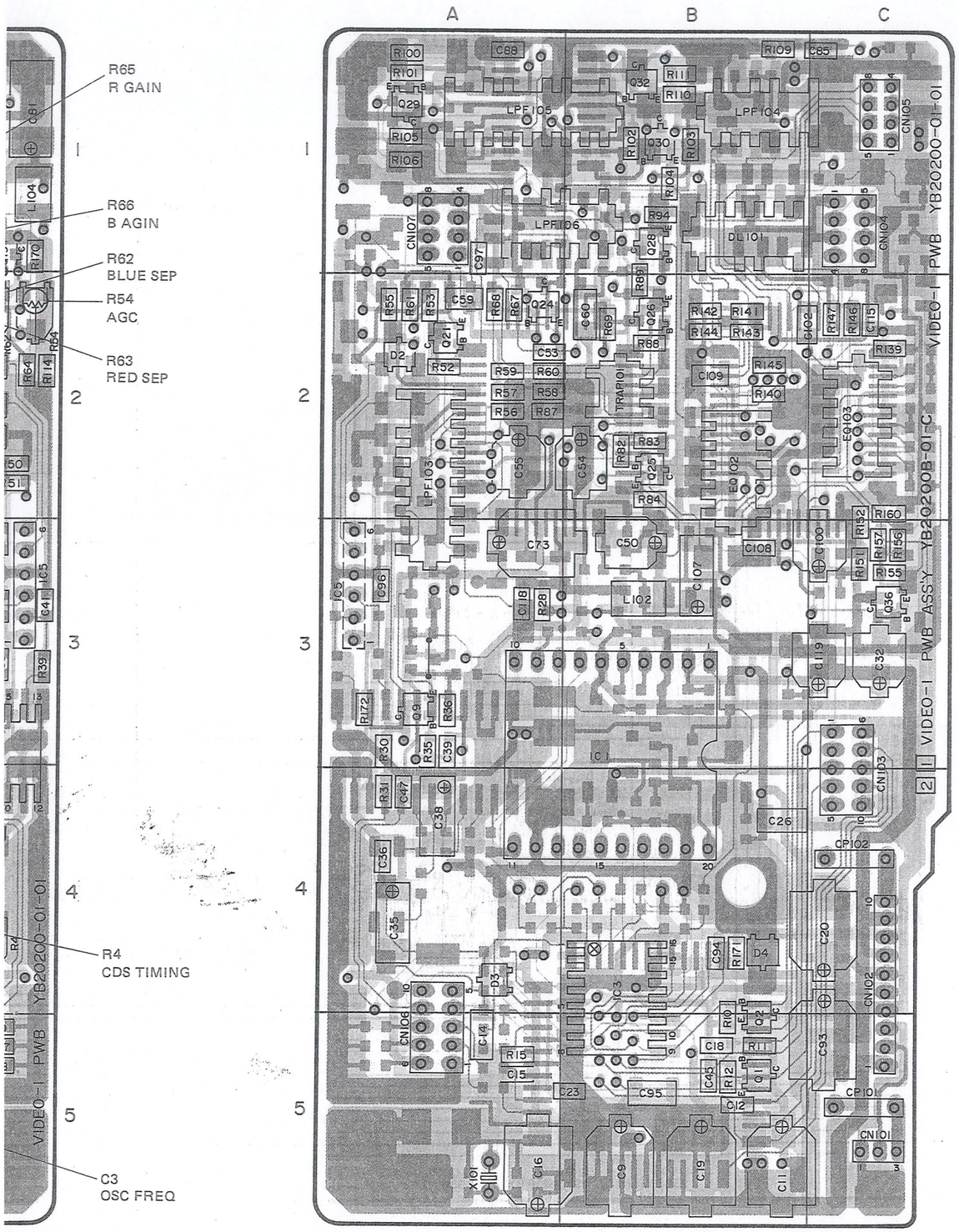
5.27 VIDEO-1 CIRCUIT BOARD





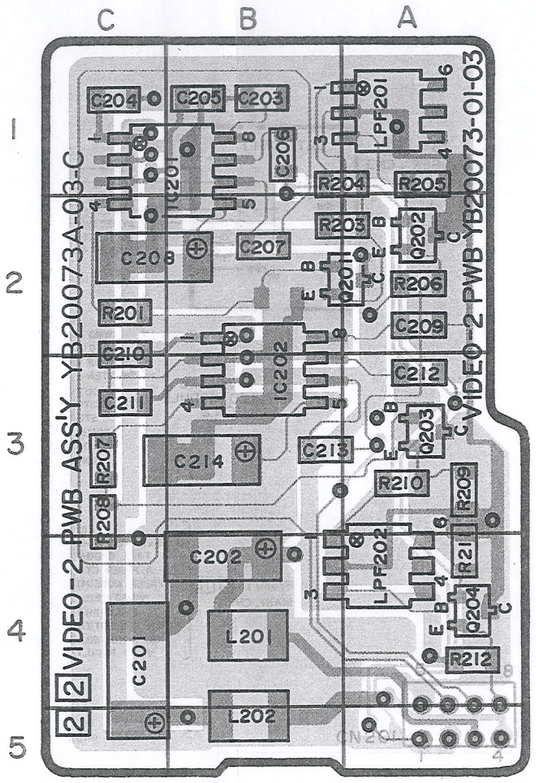
5-29

— Front —

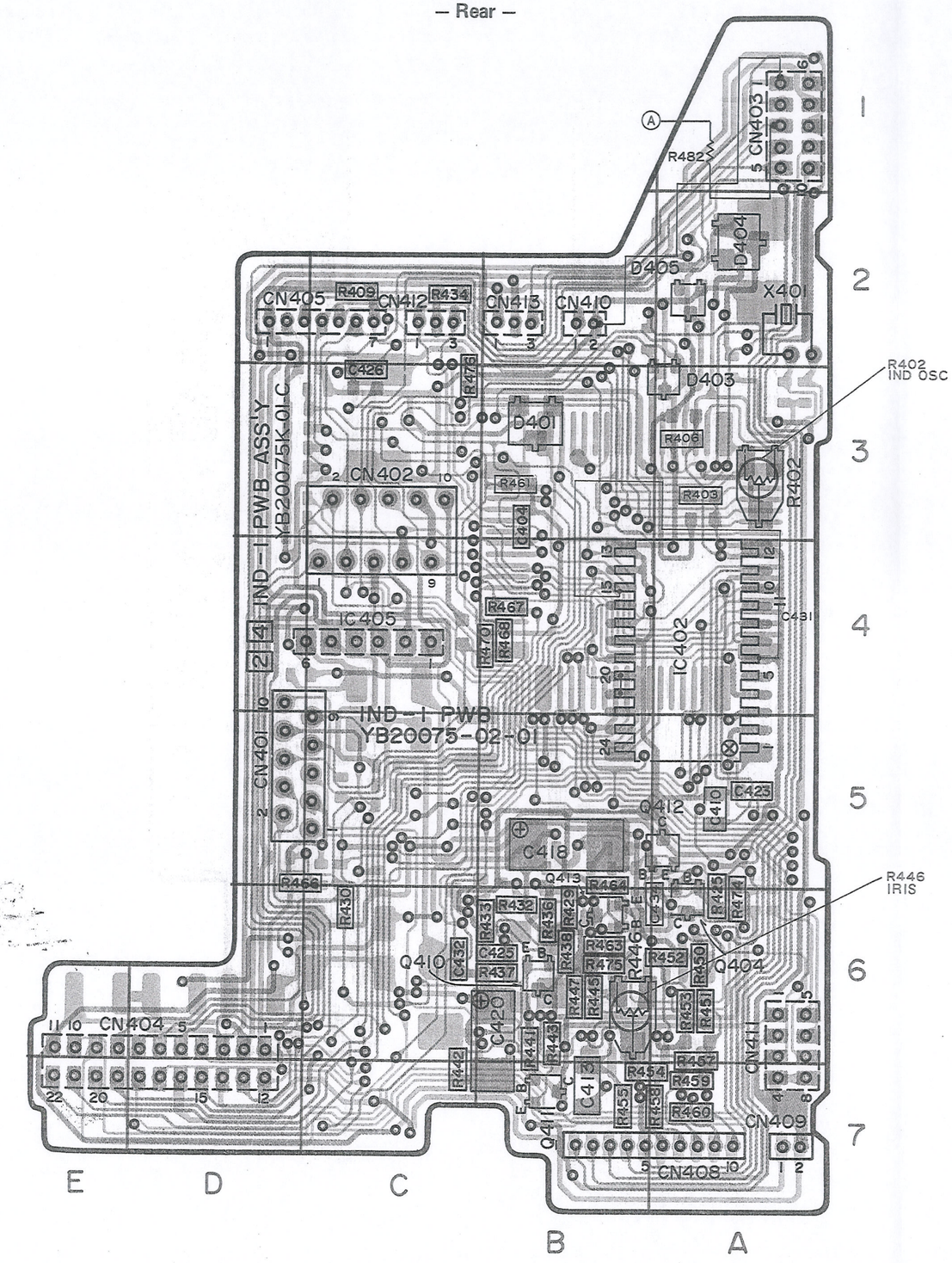


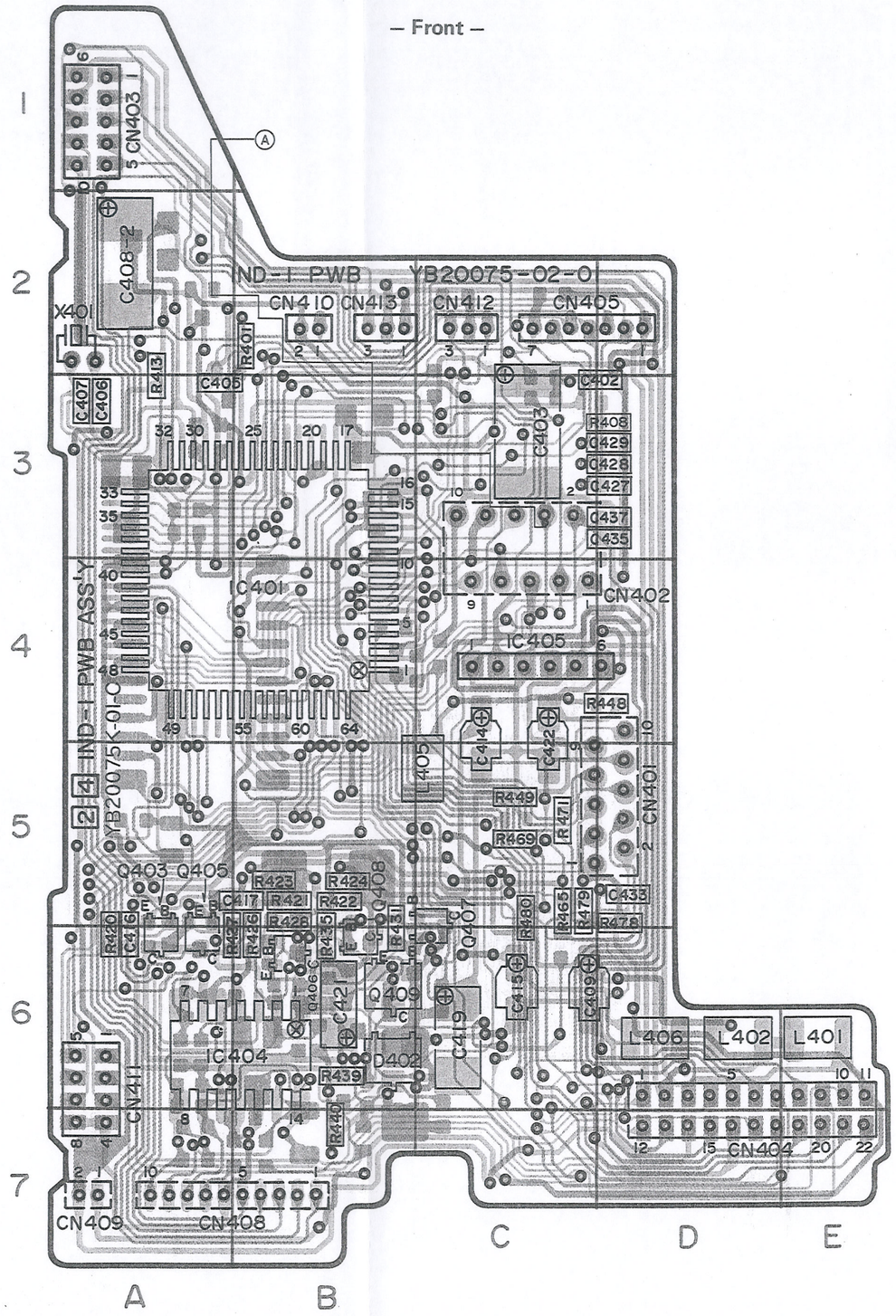
5-29

5.28 VIDEO-2 CIRCUIT BOARD



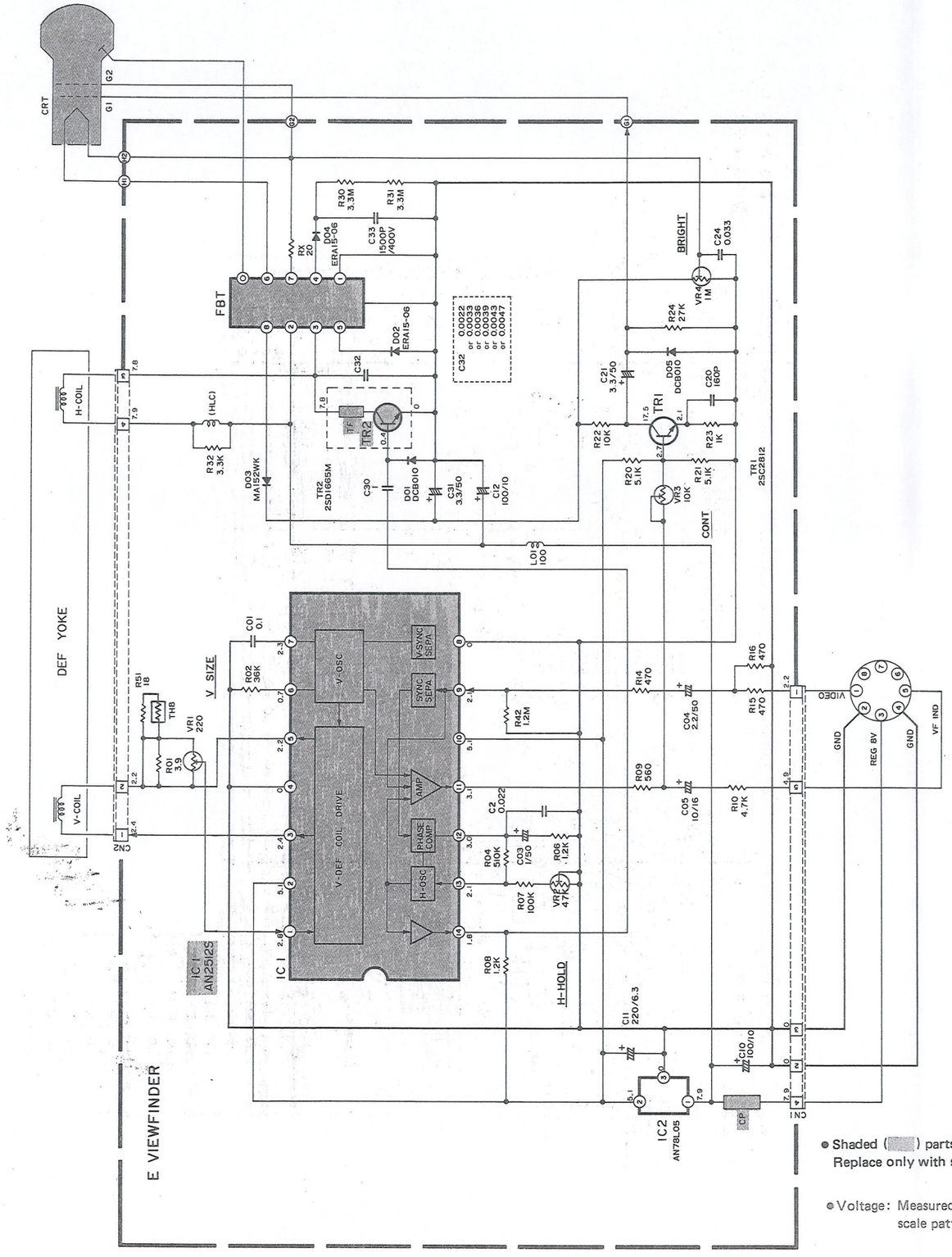
5.30 INDICATOR-1 CIRCUIT BOARD





5-31

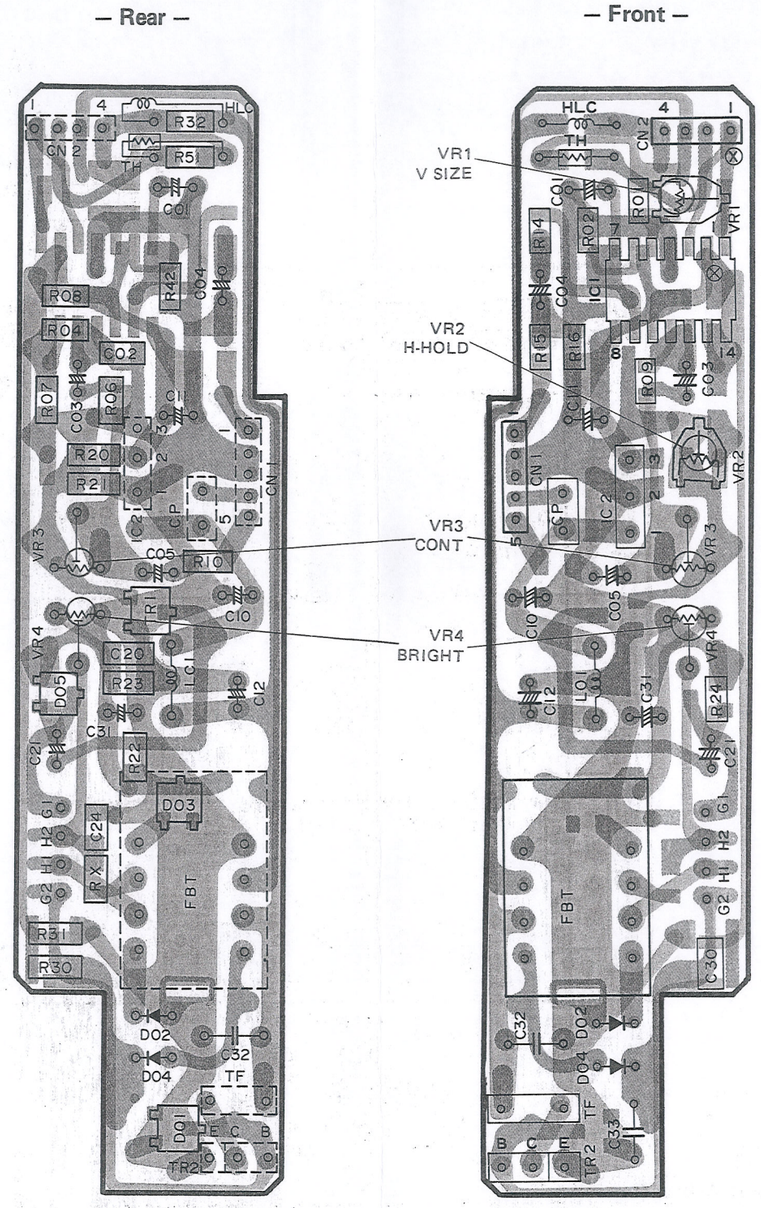
5.31 ELECTRONIC VIEWFINDER SCHEMATIC DIAGRAM



● Shaded ( ) parts are critical for safety.
Replace only with specified part numbers.

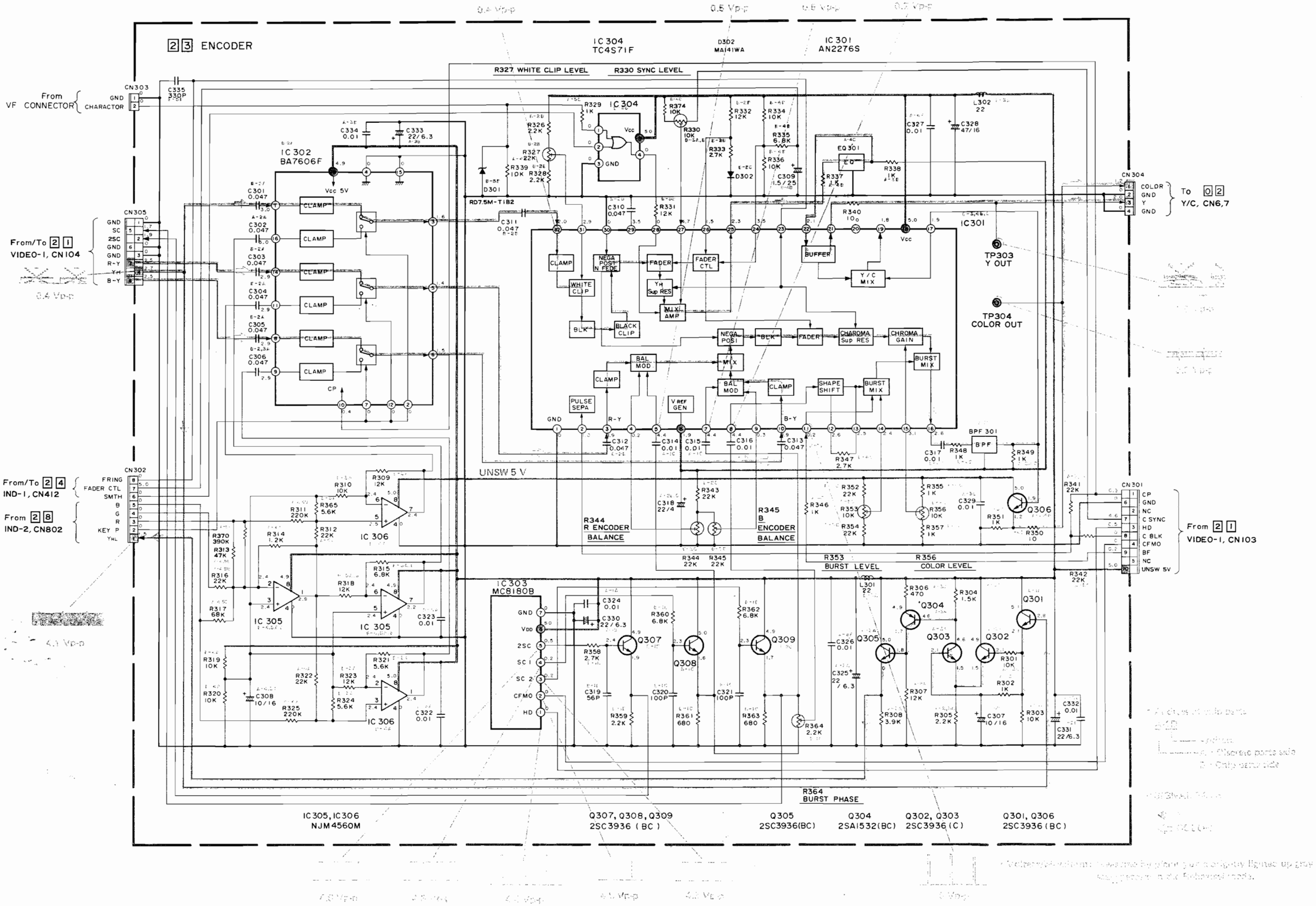
● Voltage: Measured by picking up a brightly lighted up gray scale pattern in the Rehearsal mode.

5.32 ELECTRONIC VIEWFINDER CIRCUIT BOARD



5-32

5.19 ENCODER SCHEMATIC DIAGRAM

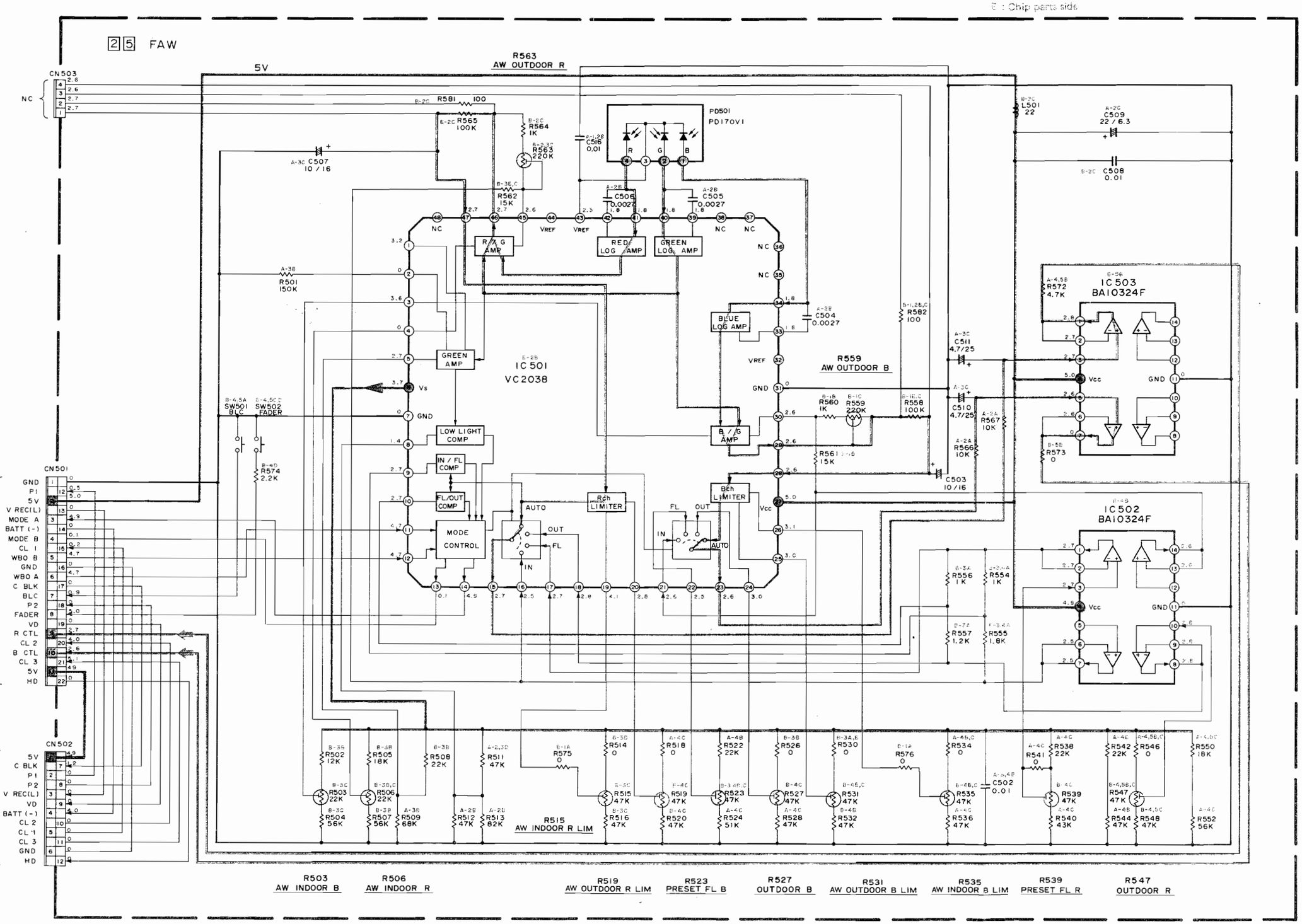


5-22

5.21 FAW SCHEMATIC DIAGRAM

« Address of chip parts
A-1D
Address
A : Discrete parts side
B : Chip parts side

« FAW SIGNAL PATH

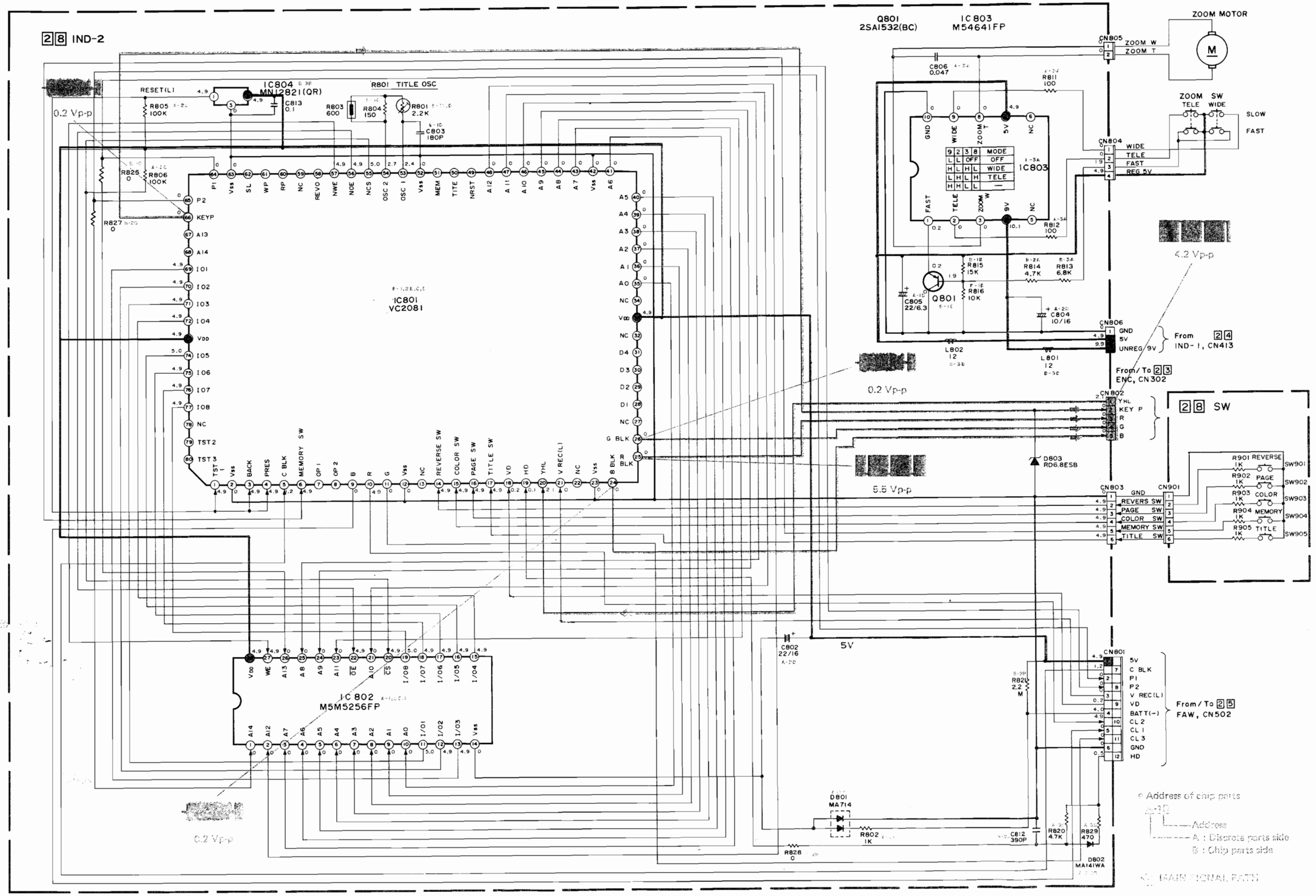


« Voltage: Measured by picking up a brightly lighted up gray scale pattern in the Rehearsal mode.

5-24

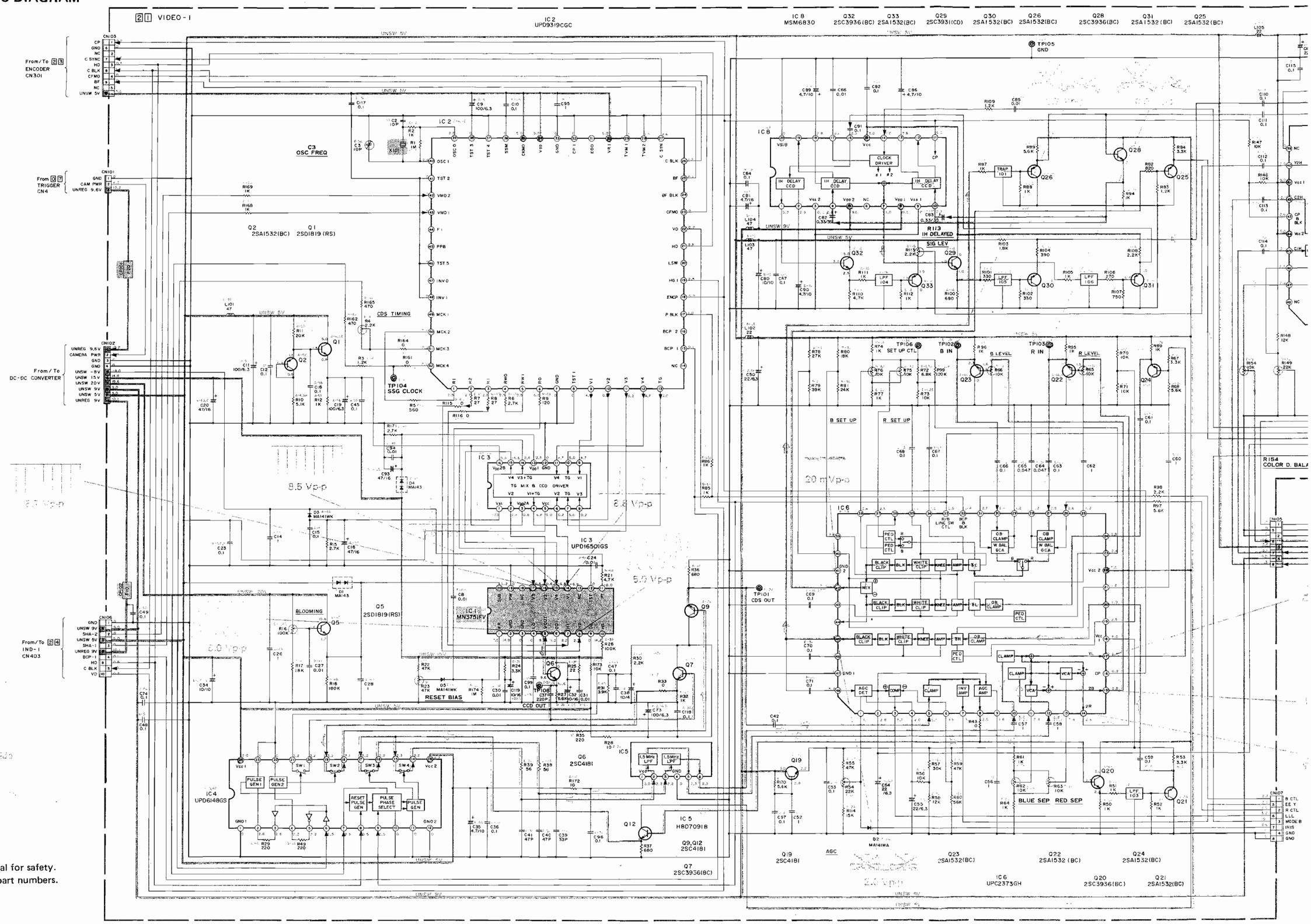
5.23 INDICATOR-2 & SWITCH SCHEMATIC DIAGRAM

< Voltage/Waveform : Measured by picking up a brightly lighted up gray rose pattern in the Rehearsal mode.



5-26

5.26 VIDEO SCHEMATIC DIAGRAM



- Shaded ( ) parts are critical for safety. Replace only with specified part numbers.

※ Voltage/Waveform: Measured by picking up a brightly lighted up gray scale pattern in the Rehearsal mode.

IC 2 UPD9319CGC

IC 8 MSM6830

Q32 2SC3936(BC) Q33 2SA1532(BC) Q29 2SC3931(CD) Q30 2SA1532(BC) Q26 2SA1532(BC) Q28 2SC3936(BC) Q31 2SA1532(BC) Q25 2SA1532(BC)

IC 7 UPC2371GH

UNSW 5V

TP105 GND

TP107 V. EDGE SIG OUT

0.7 Vp-p

0.5 Vp-p

0.5 Vp-p

0.2 Vp-p

0.4 Vp-p

0.5 Vp-p

R113 IH DELAYED SIG LEV

R135 Y LEVEL

TP106 SET UP CTL

TP102 B IN

TP103 R IN

B LEVEL

R LEVEL

B SET UP

R SET UP

20 mVp-p

8.8 Vp-p

5.0 Vp-p

0.5 Vp-p

IC 3 UPD1650IGS

IC 1 MN3751FV

RESET BIAS

TP108 CCD OUT

TP101 CDS OUT

IC 5 H8D7091B

Q6 2SC4181

Q9,Q12 2SC4181

Q7 2SC3936(BC)

Q19 2SC4181

Q23 2SA1532(BC)

Q22 2SA1532(BC)

Q24 2SA1532(BC)

IC 6 UPC2373GH

Q20 2SC3936(BC)

Q21 2SA1532(BC)

AGC

2.0 Vp-p

BLUE SEP RED SEP

R154 COLOR D. BALANCE

R149 COLOR D. OFFSET

R125 B-Y LEVEL

Q34 2SC3936(BC)

Q35,Q36 2SC3936(BC)

0.1 Vp-p

0.5 Vp-p

1.4 Vp-p

1.5 Vp-p

2 2 VIDEO-2

IC 201 MSM6984MS

IC 202 MSM6984MS

Q201 2SC3936(BC)

Q202 2SA1532(BC)

Q203 2SC3936(BC)

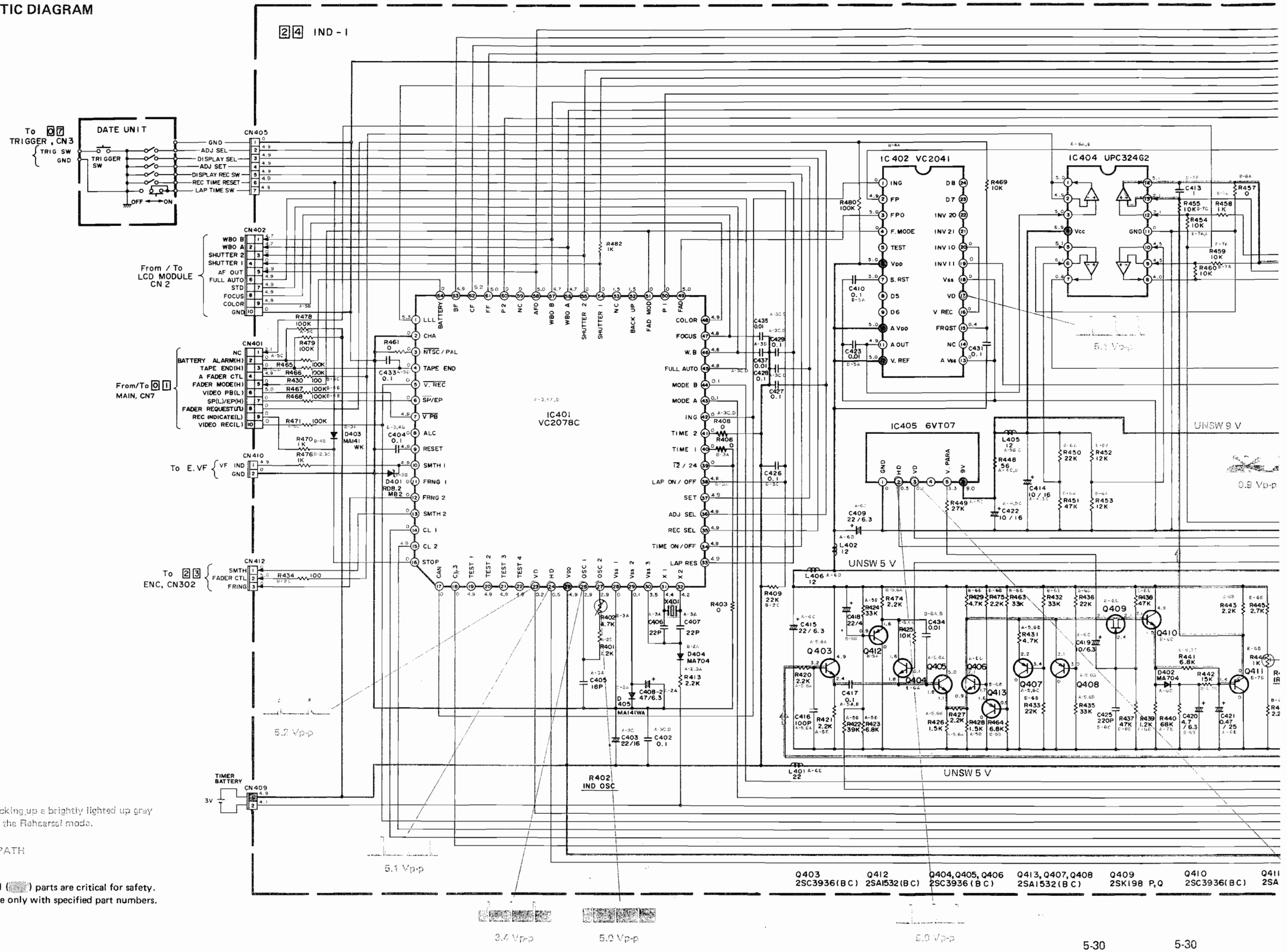
Q204 2SA1532(BC)

CN104 GND SC 2SC GND GND R-Y Y B-Y

From/To 2 3 ENCODER, CN305

CN107 B CTL EE Y R CTL LLL MODE B IRIS GND GND

From/To 2 4 IND-I, CN411



◎ Address of chip parts

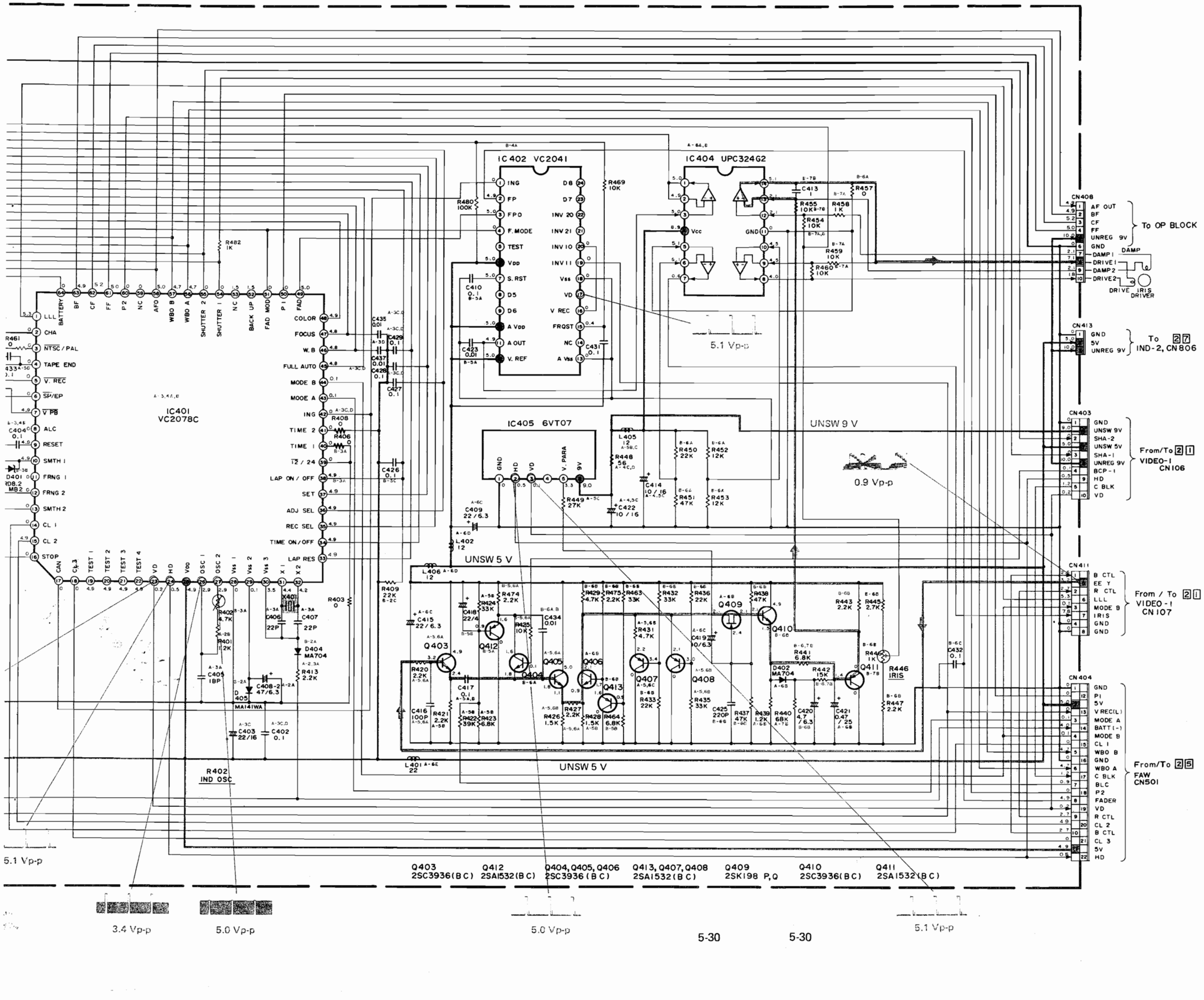
A-1D
- Address
- A : Discrete parts side
- B : Chip parts side

◇ Voltage/Waveform: Measured by picking up a brightly lighted up gray scale pattern in the Rehearsal mode.

⇐ IRIS SIGNAL PATH

● Shaded (▒) parts are critical for safety. Replace only with specified part numbers.

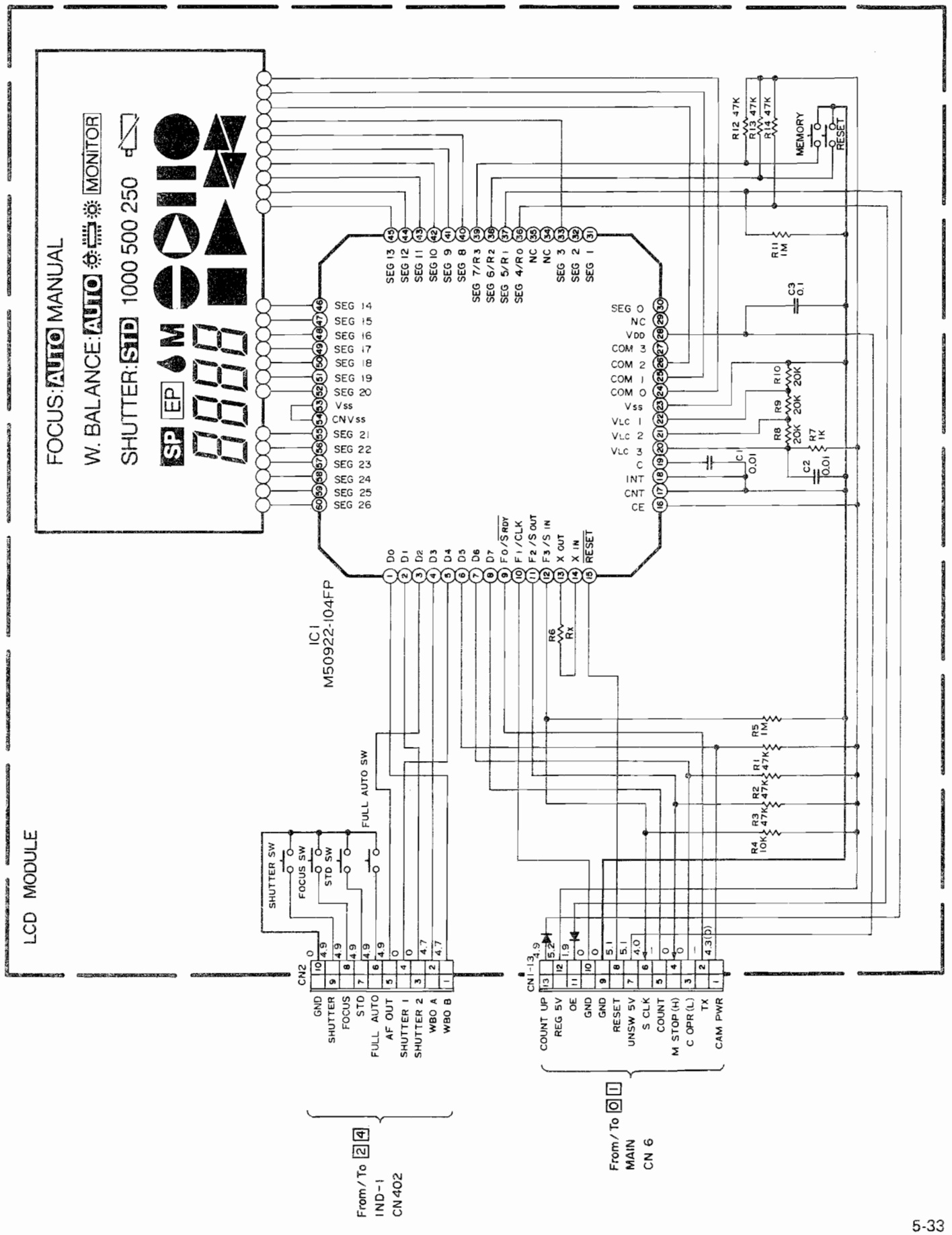
5-30
5-30


IC401
VC2078C
IC402 VC2041
IC404 UPC324G2
IC405 6VT07
5.1 Vp-p
0.9 Vp-p
UNSW 9 V
UNSW 5 V
UNSW 5 V
R402
IND OSC
5.1 Vp-p
3.4 Vp-p
5.0 Vp-p
5.0 Vp-p
5.1 Vp-p
CN408
AF OUT
BF
CF
FF
UNREG 9V
GND
DAMP I
DRIVE I
DAMP 2
DRIVE2
To OP BLOCK
DAMP
DRIVE IRIS DRIVER
CN413
GND
5V
UNREG 9V
To 27 IND-2, CN806
CN403
GND
UNSW 9V
SHA-2
UNSW 5V
SHA-1
UNREG 9V
BCP-1
HD
C BLK
VD
From/To 21 VIDEO-1 CN106
CN411
B CTL
EE Y
R CTL
LLL
MODE B
IRIS
GND
GND
From / To 21 VIDEO-1 CN107
CN404
GND
PI
5V
V REC(L)
MODE A
BATT(-)
MODE B
CL 1
WBO B
GND
WBO A
C BLK
BLC
P2
FADER
VD
R CTL
CL 2
B CTL
CL 3
5V
HD
From/To 25 FAW CN501
Q403 2SC3936(BC)
Q412 2SA1532(BC)
Q404, Q405, Q406 2SC3936(BC)
Q413, Q407, Q408 2SA1532(BC)
Q409 2SK198 P,Q
Q410 2SC3936(BC)
Q411 2SA1532(BC)

5.33 LCD MODULE SCHEMATIC DIAGRAM

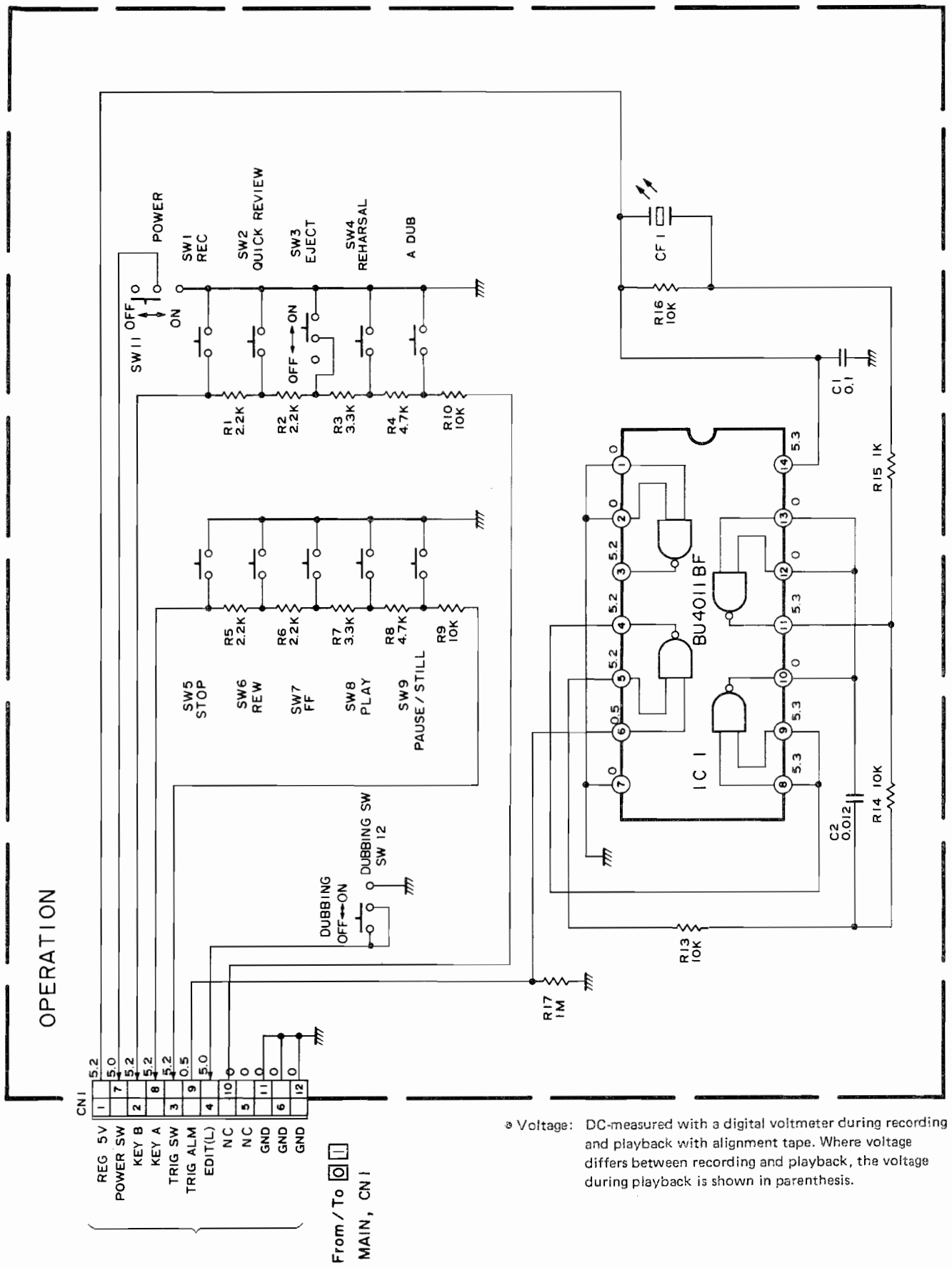
⊙ Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

Note:
This schematic diagram is only for reference.
Avoid replacing individual parts.
Replace the entire unit only.



5.34 OPERATION SCHEMATIC DIAGRAM

Note:
This schematic diagram is only for reference.
Avoid replacing indicidual parts.
Replace the entire unit only.



⊛ Voltage: DC-measured with a digital voltmeter during recording and playback with alignment tape. Where voltage differs between recording and playback, the voltage during playback is shown in parenthesis.

SECTION 6
EXPLODED VIEWS AND PARTS LIST

SAFETY PRECAUTION

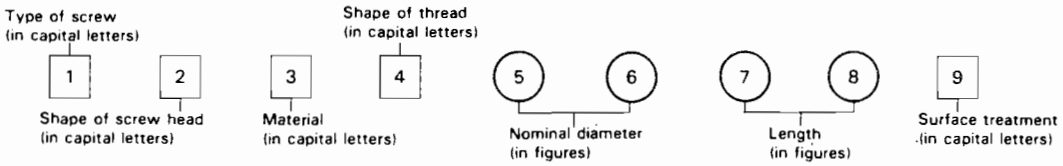
Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

NOTE: [M] indicates mechanical symbol number.

6.1 STANDARD PART NUMBER CODING

6.1.1 Screw coding

Standard screw part numbers are as follows.

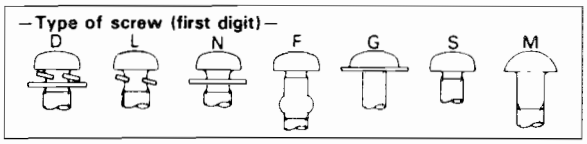


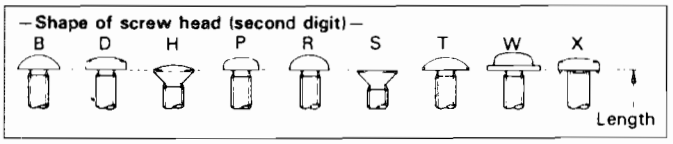
Type of screw (first digit)

- S Normal screws
- D Assembled machine screws (with plain and spring washers)
- L " (with spring washer)
- N " (with plain washer)
- F Feather screws
- G Washer head tapping screws
- M Wood screws

Shape of screw head (second digit)

- B Brazier head
- D Binding head
- H Oval countersunk head
- P Pan head
- R Round head
- S Flat head
- T Truss head
- W Washer head (machine screws)
- X Toothed head



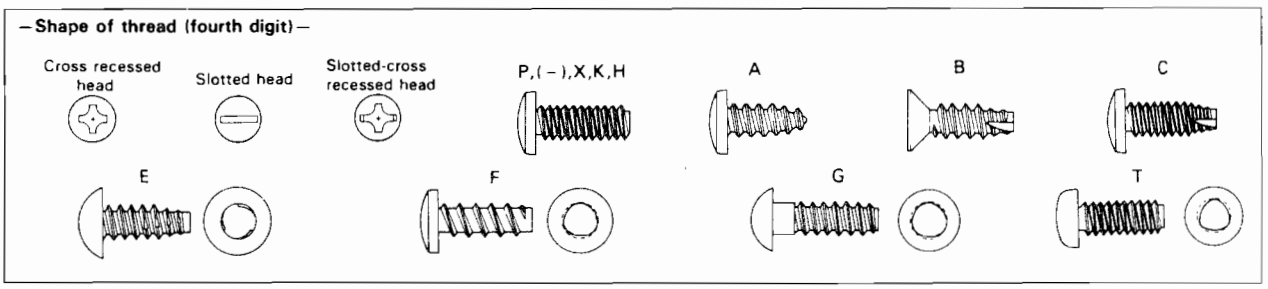


Material (third digit)

- S Steel
- E Stainless steel
- C Cast iron
- U Copper
- B Brass
- P Phosphor bronze
- N Nickel silver
- Y Cast brass
- A Aluminum
- Z Zinc alloy
- K Polycarbonate

Shape of thread (fourth digit)

- P Cross recessed head screws
- (–) Slotted head machine screws
- X Slotted-cross recessed head machine screws
- K Cross recessed head machine screws for precision equipment (type 1)
- H " (type 3)
- A Cross recessed head tapping screws (type 1)
- B " (type 2)
- C " (type 3)
- E Cross recessed head special tapping screws (brand : evertight)
- F " (brand : P-tight)
- T " (brand : taptight)
- G "



Nominal diameter (fifth and sixth digits)

The fifth and sixth digits indicate a nominal diameter or dimension. If the dimension exceeds 10 mm, three digits are used. The number indicates a nominal diameter or dimension, given in millimeters, multiplied by ten.

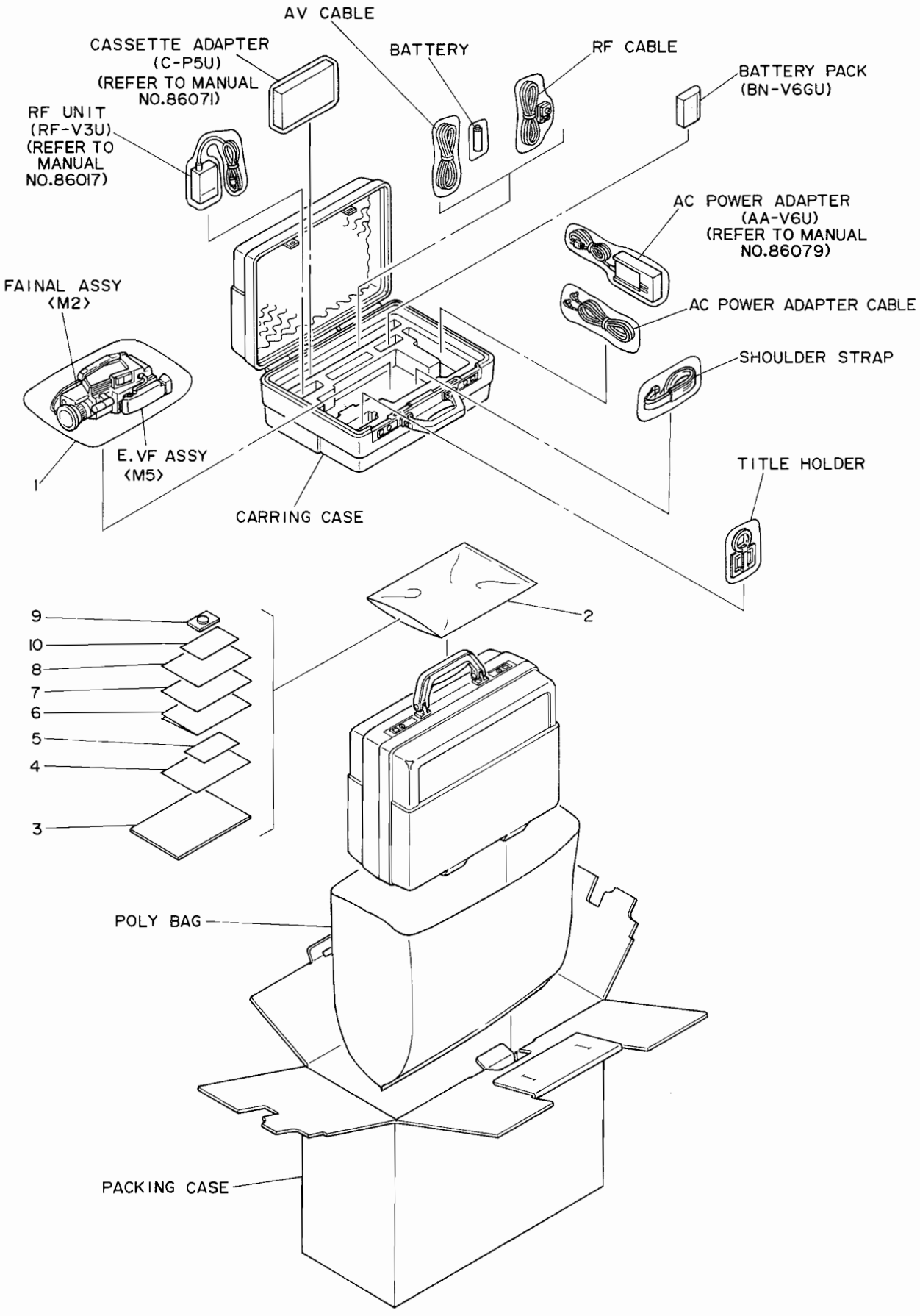
Length (seventh and eighth digits)

The seventh and eighth digits indicate length in millimeters. The preceding figure is zero when the dimension is smaller than 10 mm. For machine screws used in precision equipment whose length is given in units of 0.1 mm, the number indicates ten times the size of their length.

Surface treatment (ninth digit)

- Z Dichromate treatment after galvanizing (MFZn II-C)
- N Nickel plating (MFNiII, MFNiI)
- R Chromium plating (MBCrII, MBCrI)
- G Silver plating (SP4)
- B Black coating after plating
- F Blackening of iron (FB)
- M Blackening after galvanizing
- K Pickling of brass (PF2)
- P Phosphate treatment
- W Uni-chrome plating
- L Coated with transparent paint
- A Colored red after galvanizing (MFZnII-C)
- C Colored blue after galvanizing (MFZzII-C)
- T Colored green after galvanizing (MFZnII-C)
- V Colored purple after galvanizing (MFZnII-C)

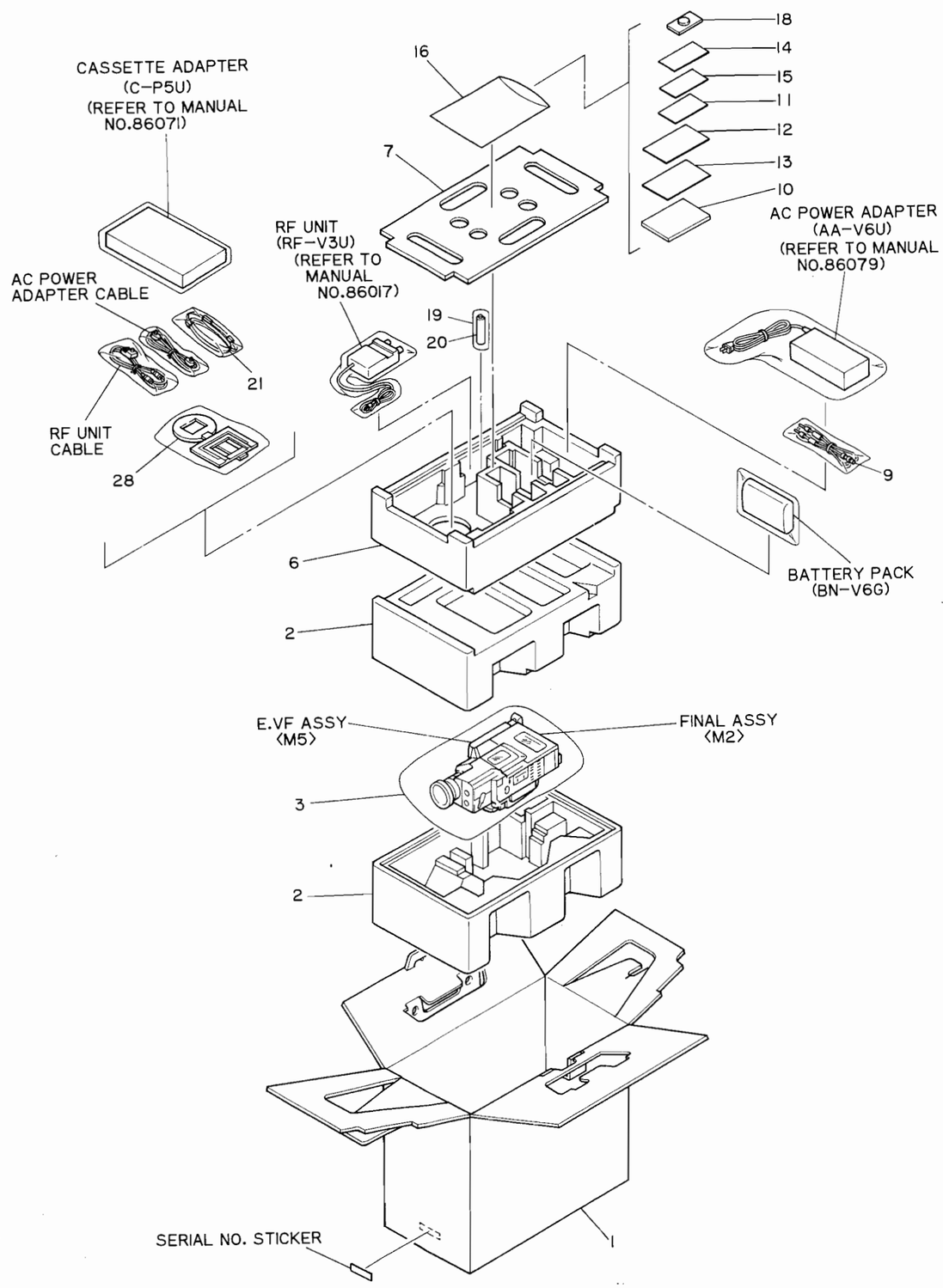
6.2 PACKING ASSEMBLY <M1> (For U.S.A.)



#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
			1. PACKING ASSEMBLY <M1> (For U.S.A.)
	1	YQM30021-11	POLY BAG
	2	QPGA025-03505	POLY BAG
	3	YU30052-79	INSTRUCTIONS
	4	YU30217-2	TITLE CARD
	5	BT-20046D	TOLL FREE CARD
	6	PU33941-3-2	SAFETY CAUTION
	7	TCN-3409	TAPE CATALOG
	8	YU40406-14	MARKET. SHEET
	9	YU40547	BATTERY
	10	BT-20062A	WARRANTY CARD

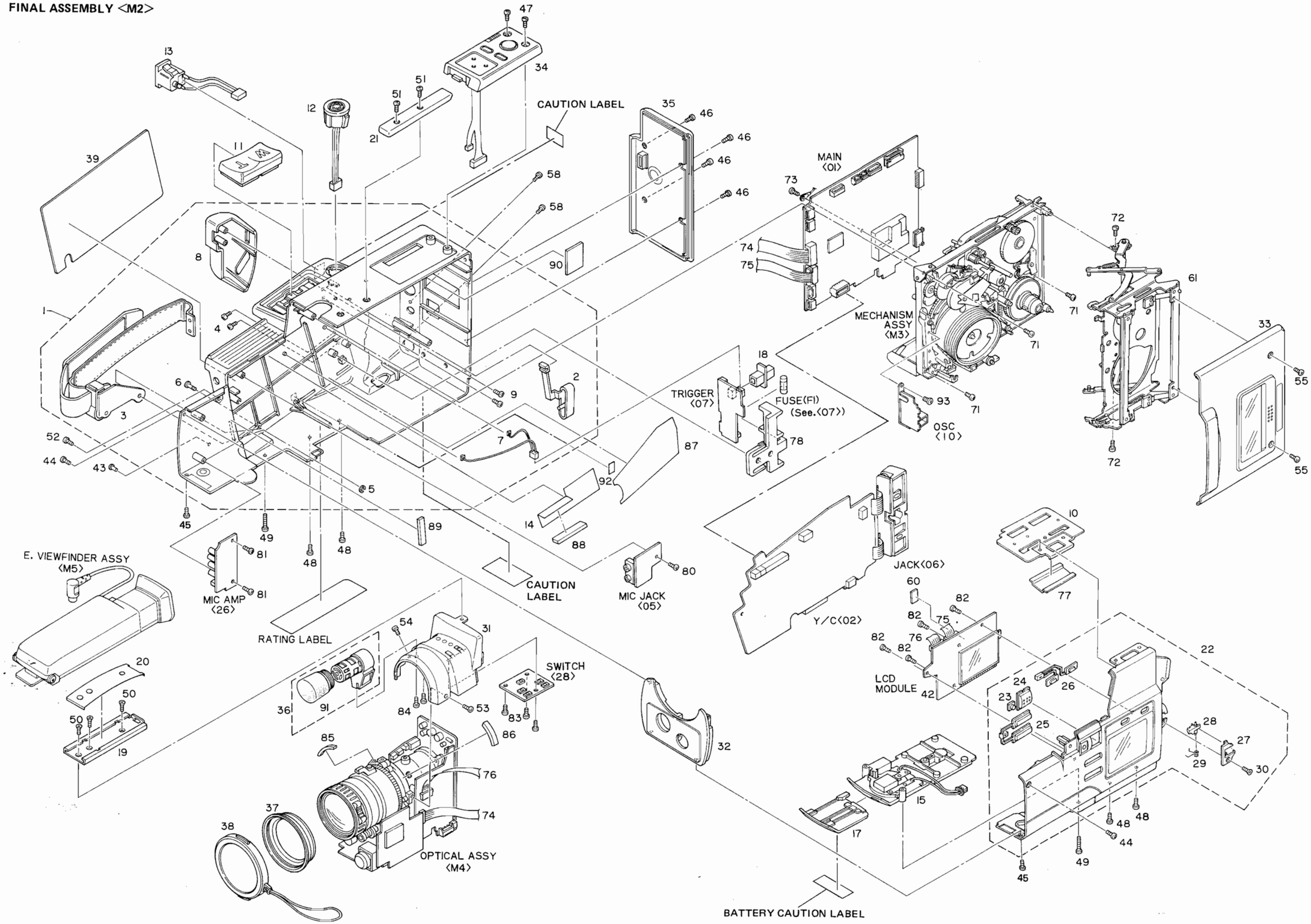
#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
			1. PACKING ASSEMBLY <M1> (For CANADA)
	1	YQ30549	PACKING CASE
	2	YU30308A	CUSHION ASSY
	3	YQM30021-11	POLY BAG
	6	YQ20227-1-2	ACCESSORY TRAY
	7	YQ41283	ACCESSORY TRAY SHEET
	9	YQ10058E	CABLE ASSY (AUDIO/VIDEO)
	10	YU30052-81	INSTRUCTIONS
	11	BT-20025K	WARRANTY CARD
	12	PU39941-3-2	SAFETY CAUTION
	13	BT-20071A	INSTRUCTION GUIDE
	14	TCN-3409	TAPE CATALOG
	15	YU30217-2	TITLE CARD
	16	QPGA025-03505	POLY BAG
	18	YU40547	BATTERY
	19	QPGA005-01005	POLY BAG
	20	UM-3DJ	BATTERY
	21	YQ10051A-3	SHOULDER STRAP
	28	YU40856-2-2	TITLE HOLDER

PACKING ASSEMBLY <M1> (For CANADA)



6-3

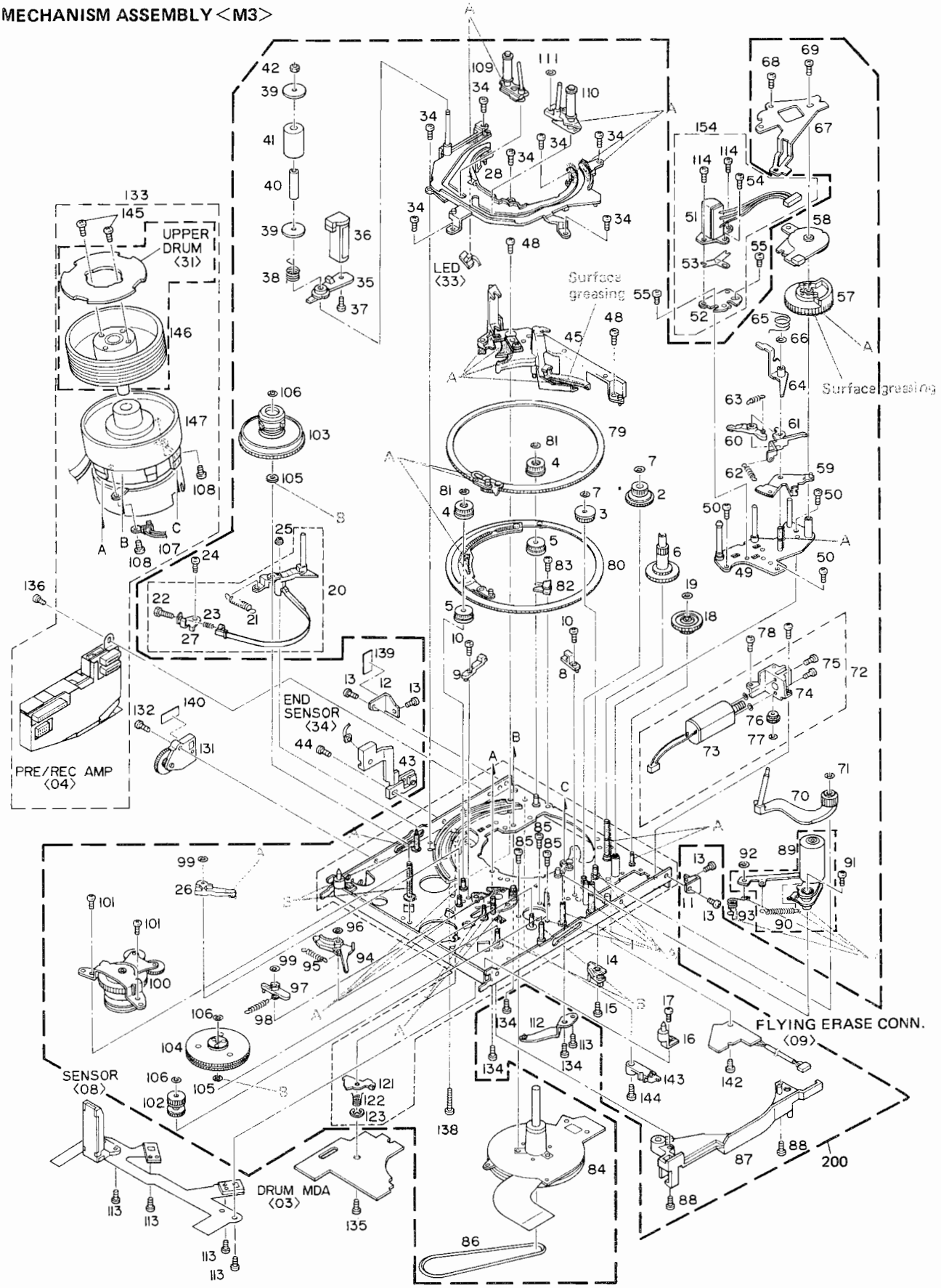
6.3 FINAL ASSEMBLY <M2>



#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
			2. FINAL ASSEMBLY <M2>
⚠	1	YQ10092AJ-24	LOWER CASE ASSY, INCL. 2–9
	2	YQ30091-2-4	BUTTON (TRIGGER)
	3	YQ20163W	GRIP BELT ASSY
	4	SSSP2006D	SCREW,X2
	5	REE2500	E.RING
	6	YQ40413	STUD
	7	ML-Y00062A	B.T.WIRE ASS'Y
	8	YQ30098-26	FINGER REST
	9	SDSF2006Z	SCREW,X2
	10	YQ40417	SHOE BRACKET
	11	YU40204-4	ZOOM SWITCH
	12	YS40011C	E VF CONNECTOR ASSY
	13	YS40004B	DC JACK ASSY
	14	YQ40544	SHIELD SPACER 1
	15	YQ30099A-5	BASE ASSY
⚠	17	YQ30276-1-3	B.U.BATT.COVER
	18	YQ40418-2	ALARM KNOB
	19	YQ40419-1-2	SHOE
	20	YQ40420-1-2	SHOE SPRING
	21	YQ40421-1-1	DECO PLATE
⚠	22	YQ10126D-7	UPPER CASE ASSY, INCL. 23–30
	23	YQ41163-1-1	FULL AUTO KEY
	24	YQ41164-1-2	FOCUS KEY
	25	YQ41165-1-1	WHITE BALANCE KEY
	26	YQ41166	MEMORY KEY
	27	YQ30110	TAPE G.HOLDER
	28	YQ30109-1-1	TAPE GUIDE(D)
	29	YQ40451	TORSION SPRING
	30	SSSG1740M	SCREW
⚠	31	YQ30449C-3	FRONT COVER ASSY
⚠	32	YQ30456C	FRONT PANEL ASSY
⚠	33	YQ30454D-2	CASSETTE COVER ASSY
	34	YQ30059-23	DATE UNIT
	35	YQ20197-10-9	OPERATION UNIT
	36	YU40631	MICROPHONE, INCL. 91
	37	YU40692	HOOD
	OR	YU40935	HOOD
	38	YQ40822A	HOOD CAP ASSY
⚠	39	YU30207	BATTERY BASE SHEET
	42	YU41055-3	LCD MODULE
	43	YQ40703	CAP
	44	YQM30032-2-2	SPECIAL SCREW, X2
	45	YQM30032-3-2	SPECIAL SCREW, X2

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	46	YQM30032-2-2	SPECIAL SCREW,X4,M2X5
	47	YQM30032-4-2	SPECIAL SCREW,X2
	48	YQM30032-1-2	SPECIAL SCREW,X3,M2X4
	49	YQM30032-23	SPECIAL SCREW,X2
	50	SSSP2005D	SCREW,X3
	51	YQM30032-16-2	SPECIAL SCREW,X2
	52	YQM30032-1-2	SPECIAL SCREW
	53	YQM30032-9	SPECIAL SCREW
	54	YQM30032-1-2	SPECIAL SCREW
	55	YQM30032-1-2	SPECIAL SCREW,X2
	58	YQM30032-6-2	SPECIAL SCREW,X2
	60	YQ40520	DUMPER COVER
	61	YQ20068C	CASSETTE HOUSING ASSY
	71	SPSG2608Z	SCREW,X3
	72	SPSK1730M	SCREW,X2
	73	YQ40691	SPECIAL SCREW
	74	YU40614-3	FLAT WIRE 3
	OR	YU40894	FLAT WIRE3
	75	YU41014	FLAT WIRE 4
	OR	YU41013	FLAT WIRE 4
	76	YU40616	FLAT WIRE 5
	OR	YU40896	FLAT WIRE 5
	77	YQ40667	SCREW COVER
	78	YQ30090-1-1	TRIGGER BOARD STOPPER
	80	SDSF2006Z	SCREW
	81	SDSF2006Z	SCREW,X2
	82	SDSF2005Z	SCREW,X4
	83	YQM30032-29	SCREW,X3
	84	YQM30032-29	SCREW,X2
	85	YQM30029-4	SPACER
	86	YQM30029-5	SPACER
	87	YQ40545	SHIELD SPACER 2
	88	YQM30029-8	SPACER
	89	YQM30029-7	SPACER
	90	YQM30029-9	SPACER
	91	YU40631-001	WIND SCREEN
	92	YQ40903-1-1	SPACER
	93	SPSH1725M	SCREW

6.4 MECHANISM ASSEMBLY <M3>



Classification	Name	Parts No.	Symbol in drawing
Grease	Moriton Grease No. 1	MOS2-C	A
Oil	Cosmo Hydro HV100	YTU94027	B

Note:
The sections marked in red indicate lubrication and greasing areas. Follow the items for maintenance and checks, lubricating or greasing the red sections when necessary.

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION

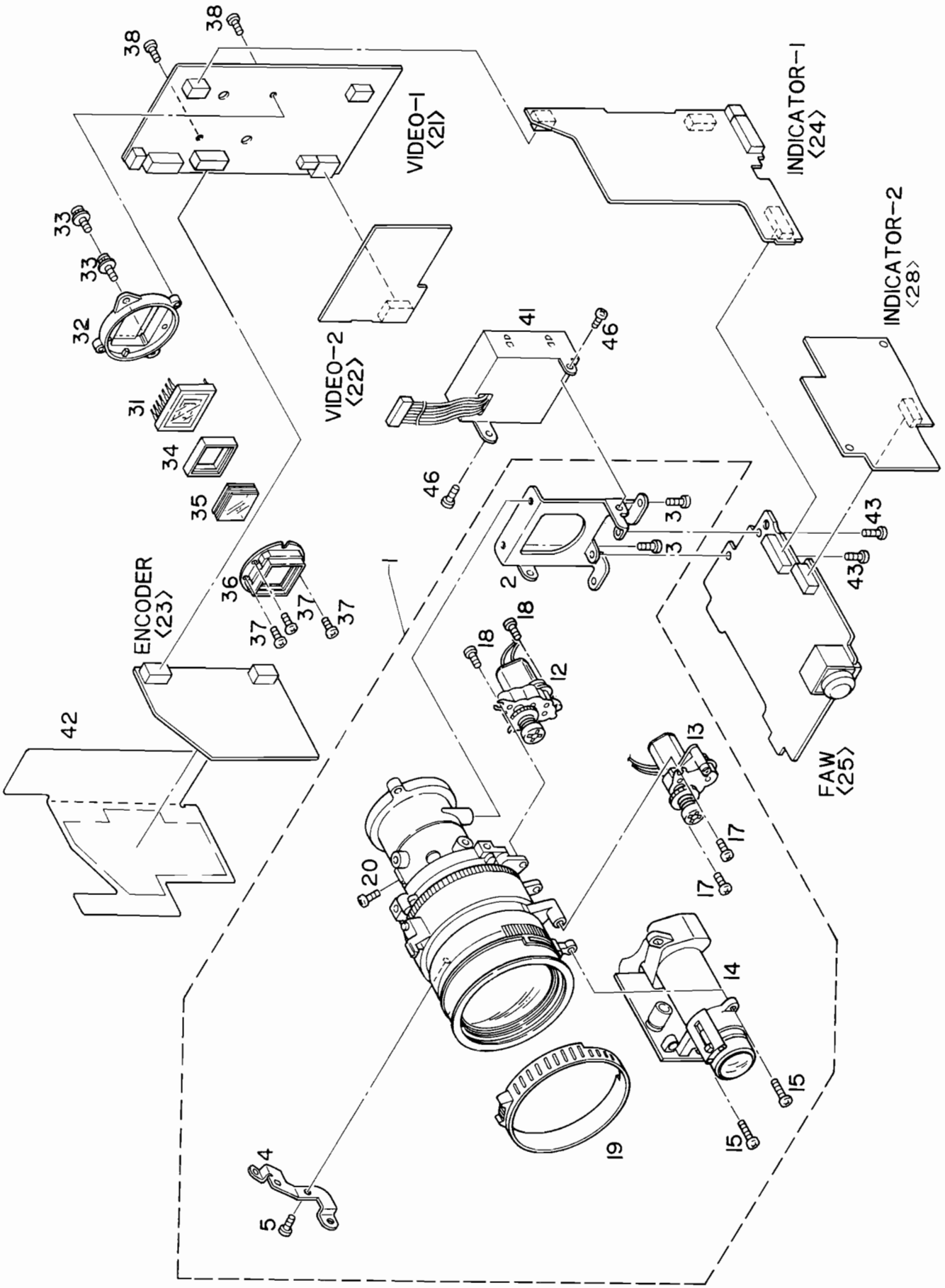
****

****
* 3. MECHANISM ASSEMBLY <M3> *
****

	1	YQ10089A-9	MAIN DECK ASSY,INCL.121-123
	2	YQ40744	LOADING GEAR 1
	3	YQ40123	LOADING GEAR 2
	4	YQ40124	RING GUIDE GEAR(S),X2
	5	YQ40125-2	RING GUIDE GEAR(T),X2
	6	YQ30271	TERMINAL GEAR
	7	PQM30017-27	SLIT WASHER,X2
	8	YQ40746-1-1	RING GUIDE 1
	9	YQ40128-1-1	RING GUIDE 3
	10	SPSH1725M	SCREW,X2
	11	YQ40747	SUPPORT(L)
	12	YQ40748	SUPPORT(R)
	13	SPSH1725M	SCREW,X4
	14	YQ30460	LOADING GUIDE
	15	SPSH1740M	MINI SCREW
	16	YQ40801-1-4	GUIDE PIN
	17	SPSH1725M	SCREW
	18	YQ40750	MIDDLE GEAR
	19	PQM30017-27	SLIT WASHER
	20	YQ40389B-4	TENSION SERVO AY,INCL.21-23,27
	21	YQM30001-30	TENSION SPRING
	22	SPSK1780M	MINI SCREW
	23	YQM30002-1	COMPRESSION SPRING
	24	SPSH1725M	SCREW
	25	YQ40059	CAP
	26	YQ30322-1-1	SEARCH BRAKE LINK
	27	YQ40266	ADJUST PLATE
	28	YQ40759A-4	GUIDE RAIL ASSY
	34	SPSH1725M	SCREW,X7
	35	YQ20050-1-7	FE HEAD ARM
	36	YU40492-2	FULL ERASE HEAD
	37	SPSK1630M	SCREW
	38	YQ40391-1-2	TORSION SPRING
	39	YQ40063	FLANGE,X2
	40	YQ41378	COLLAR
	41	YQ40065-2	IMPEDANCE ROLLER
	42	NTS2000N	NUT
	43	YQ30265	END SENSOR BRACKET
	44	SPSH1740M	MINI SCREW
	45	YQ40762A-4	UV BASE ASSY
	48	SPSH1730M	MINI SCREW,X2
	49	YQ40763A-5	SUB DECK ASSY
	50	SPSH1725M	SCREW,X3
	51	YU40618	AUDIO/CONTROL HEAD
	52	YQ40768	X PLATE
	53	YQ40354-1-2	HEAD SPRING
	54	YQ40904B	ALOCK SCREW
	55	YQ40904C	ALOCK SCREW,X2
	57	YQ20057-1-3	CAM GEAR
	58	YU41080	CAM ENCODER
	59	YQ40769A-5	ARM GEAR ASSY
	60	YQ40358	LOCK ARM 1
	61	YQ40771	LOCK ARM 2
	62	YQ40342	TENSION SPRING
	63	YQ40362	TENSION SPRING
	64	YQ40772A-1	LOCK ARM 3 ASSY
	65	YQ41113	TORSION SPRING
	66	PQM30017-25	SLIT WASHER
	67	YQ30266-1-4	MIDDLE POLE STOPPER
	68	SPSH1725M	SCREW
	69	SPSH1780M	SCREW
	70	YQ40774A-1	MIDDLE POLE ASSY

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	71	PQM30017-23	SLIT WASHER
⚠	72	YQ30272A-5	MC.MOTOR BKT.ASSY,INCL.73-77
⚠	73	YU40620V-1	MODE CONTROL MOTOR
	74	YQ40777A-4	MODE CONTROL BRACKET SA
	75	SPSH1425M	SCREW,X2
	76	YQ40778	WORM WHEEL
	77	PQM30017-27	SLIT WASHER
	78	SPSH1730M	MINI SCREW,X2
	79	YQ40779A	SUPPLY LOADING RING ASSY
	80	YQ40781A-3	TAKE UP LOADING RING ASSY
	81	PQM30017-27	SLIT WASHER,X2
	82	YQ40784	RING GUIDE 2
	83	SPSH1725M	SCREW
⚠	84	YU40621V	CAPSTAN MOTOR ASSY
⚠	OR	YU40930V	CAPSTAN MOTOR ASSY
	85	SPSH1725M	SCREW,X3
	86	YQM30003-3	BELT
	87	YQ30268-1-3	CAPSTAN MOTOR COVER
	88	SPSH1740M	MINI SCREW,X2
	89	YQ40785A-1	PINCH ROLLER ARM ASSY,INCL.90
	OR	YQ40785C	PINCH ROLLER ARM ASSY,INCL.90
	OR	YQ40785B-1	PINCH ROLLER ARM ASSY,INCL.90
	90	YQ40793	TENSION SPRING
	91	PQ41535-4	SCREW
	92	PQM30017-27	SLIT WASHER
	93	YQ40794-1-1	TORSION SPRING
	94	YQ30269	TU.BRAKE LEVER
	95	YQ40796-1-2	TENSION SPRING
	96	PQM30017-27	SLIT WASHER
	97	YQ30270	SEARCH BRAKE LEVER
	98	YQ40798-1-1	TENSION SPRING
	99	PQM30017-27	SLIT WASHER,X2
	100	YU40622-1-2	CENTER PULLEY BRACKET ASSY
	101	SPSH1725M	SCREW,X2
	102	YQ40147-1-1	TU GEAR
	103	YU40623-1-1	SUP.REEL DISC ASSY
	104	YU40624-1-1	TU.CLUTCH ASSY
	105	Q03093-835	WASHER,X2
	106	PQM30017-27	SLIT WASHER,X3
	107	YU41074	DEW SENSOR
	108	SPSK1725M	SCREW,X2
	109	YQ40083C-12	SUP POLE BASE ASSY
	110	YQ40799B-5	TU POLE BASE ASSY
	111	PQM30017-27	SLIT WASHER
	112	YU40716	BRUSH
	113	SPSH1730M	MINI SCREW,X5
	114	YQ40904A-1	ALOCK SCREW,X2
	121	YQ40737-1-2	EJECT LEVER
	122	YQ40739-1-3	TORSION SPRING
	123	REE4000	E REING
	131	YU40001	DAMPER
	132	SPSH1760M	SCREW
⚠	133	YDV2017A	DRUM ASSY,INCL<04><31>107,108, 145 – 147
	134	SPSH1730M	MINI SCREW,X3
	135	PQ41450-2	SCREW,X2
	136	SPSH1720M	MINI SCREW
	138	SPSH1711M	SCREW
	139	YQ40520	DUMPER COVER
	140	YQ40520	DUMPER COVER
	142	PQ41450-2	SCREW
	143	YQ41172	FLY WIRE GUIDE
	144	SPSH1725M	SCREW
	145	YDM4031	SCREW,X2
	146	YDM2018A	UPPER DRUM ASSY
	147	YDM2020B	LOWER DRUM MOTOR ASSY
	154	YS40016C	A/C HEAD ASSY, INCL. 51–54, 114
	200	YS20144D	MECHANISM SUB ASSY

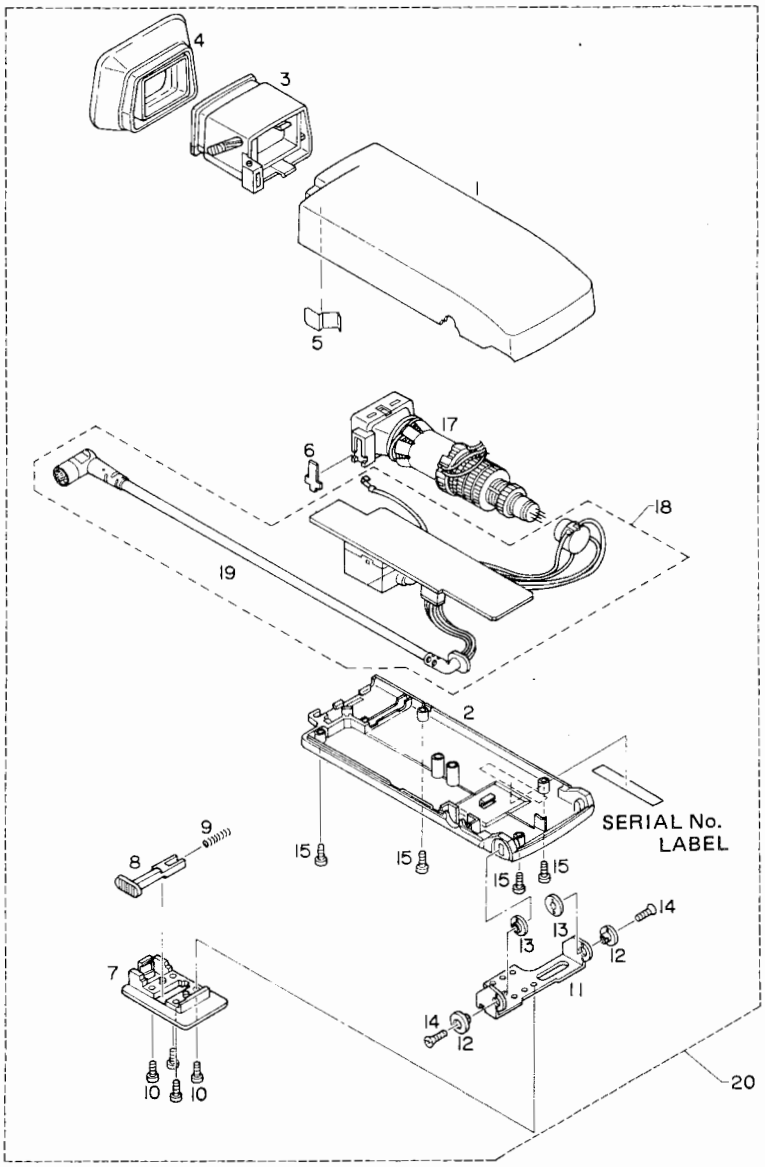
6.5 OPTICAL BLOCK ASSEMBLY <M4>



#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
⚠	1	YU40693-4-3	OP BLOCK ASSY,INCL.2-5,12-20
⚠		OR YU40693-4	OP BLOCK ASSY,INCL.2-5,12-20
⚠		OR YU40693-6	OP BLOCK ASSY,INCL.2-5,12-20
	2	YQ40826-1-2	OP BRACKET
	3	SDSF2605Z	SCREW,X2
	4	YQ40711	LENS BRACKET
	5	SDSF2605Z	SCREW
	12	YU40693-002	ZOOM MOTOR UNIT
	13	YU40693-003	AUTO FOCUS UNIT
	14	YU40693-004	AUTO FOCUS UNIT
	15	YU40693-005	SCREW, X2 M1.7 X6
	17	YU40693-006	SCREW, X2 M1.7 X4
	18	YU40693-006	SCREW, X2 M1.7 X4
	19	YU40693-009	RUBBER
	20	YU40693-010	SCREW, M2. X5.5
⚠	31	MN3751FV	IC(CCD)
	32	YQ30046	IMAGER HOLDER
	33	DPSP2008Z	SCREW,X2
	34	PQ42339	SPACER RUBBER
	35	YU40694	OPTICAL LPF
	36	YQ30096-2	OPTICAL LPF HOLDER
	37	SPSK2004F	MINI SCREW,X3
	38	SPSP2004Z	SCREW,X2
⚠	41	YU40838	DC-DC CONVERTER
⚠		OR YU41058	DC-DC CONVERTER
	42	YU30212	SHIELD PLATE
	43	SPSP2004Z	SCREW,X2
	46	SPSP2004Z	SCREW,X2

4. OPTICAL BLOCK ASSEMBLY <M4>

6.6 ELECTRONIC VIEWFINDER ASSEMBLY <M5>



#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
			**********
			**********
			* 5. ELECTRICAL VIEWFINDER ASSEMBLY <M5> *
			**********
	1	YU30181-118	TOP CASE
	2	YU30181-002	BOTTOM CASE
	3	YU30181-003	LENS ASSY
	4	YU30181-004	LENS RUBBER
	5	YU30181-005	PLATE SPRING
	6	YU30181-014	HIGH VOLTAGE COVER
	7	YU30181-006	SHOE
	8	YU30181-007	LEVER
	9	YU30045-016	SPRING
	10	YU30045-013	SCREW, X4
	11	YU30181-008	ARM
	12	YU30181-009	COVER, X2
	13	YU30045-022	BUSHING, X2
	14	YU30181-010	SCREW, X2
	15	YU30045-014	SCREW, X4
	17	YU30181-011	CRT ASSY
	18	YU30181-012	E. VF 8OARD ASSY, INCL. 19
	19	YU30181-013	VF CA8LE
⚠	20	YU30181AH	E. VIEWFINDER ASSY, INCL. 1–19

SECTION 7
ELECTRICAL PARTS LIST

SAFETY PRECAUTION

Parts identified by the ⚠ symbol are critical for safety. Replace only with specified part numbers.

ABBREVIATIONS USED IN THIS PARTS LIST

RESISTORS	: All resistance values are in ohms (Ω), unless otherwise indicated.
k	: 1,000 (Kilo)
M	: 1,000,000 (Mega)
RESISTOR	: Resistor Carbon resistor Chip resistor Double chip resistor
FUSIBLE RESISTOR	: Fusible resistor
MF RESISTOR	: Metal film resistor
MP RESISTOR	: Metal plate resistor
OMF RESISTOR	: Oxide metal film resistor
V RESISTOR	: Variable resistor Chip variable resistor

CAPACITORS	: All capacitance values are in μF, unless otherwise indicated.
pF	: Picofarad (10^{-6} μF)
CAPACITOR	: Capacitor Ceramic capacitor Chip capacitor
E CAPACITOR	: Electrolytic capacitor Chip electrolytic capacitor
FM CAPACITOR	: Film Mica capacitor
M CAPACITOR	: Mylar capacitor
MM CAPACITOR	: Metalized mylar capacitor Metalized paper capacitor
NP E CAPACITOR	: Non-polar electrolytic capacitor Non-polar capacitor
PP CAPACITOR	: Polypropylene capacitor
TANTAL CAPACITOR	: Tantalum capacitor Chip tantalum capacitor
TF CAPACITOR	: Thin film capacitor
TRIMMER CAPACITOR	: Trimmer capacitor Chip trimmer capacitor

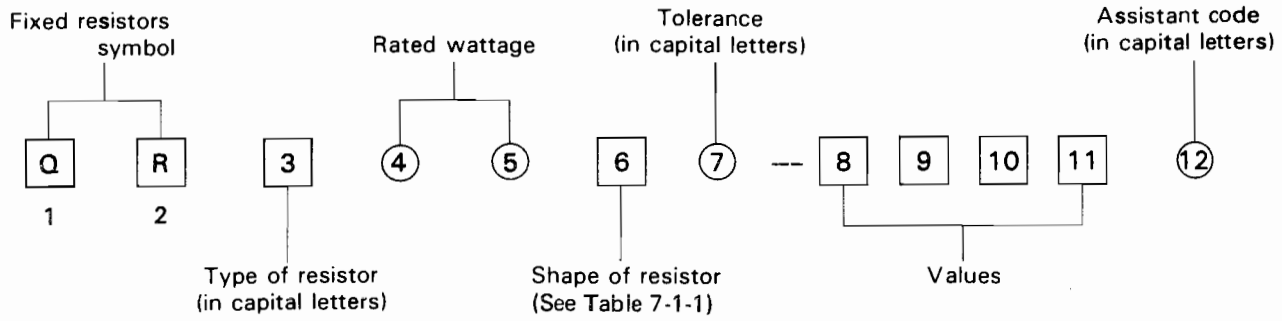
Notes:

- <2 digits> indicates circuit board symbol number.
- "X " indicates quantity per set.

7.1 STANDARD PART NUMBER CODING

7.1.1 Fixed resistor coding

Fixed resistor part numbers are as follows.



Type of resistor (third digit)

C	Composition resistors
D	Carbon resistors
F	Unflammable resistors
G	Oxide metal film resistors
H	Fusible resistors
M	Metal plate resistors
S	Metal glazed resistors
V	Precision metal film resistors
W	Wire wound resistors
X	Metal film resistors
Z	Special resistors
B	Network resistors

Notes: first—third digits
NR□ : Chip resistors
QVP : Variable resistors
NVP : Chip variable resistors
NRB : Chip network resistors

Rated wattage (fourth and fifth digits)

A0	1/10 W
18	1/8 W
16	1/6 W
14	1/4 W
12	1/2 W
01	1 W
02	2 W
03	3 W
04	4 W
05	5 W
06	6 W
07	7 W
75	7.5 W
08	8 W
10	10 W
15	15 W
A6	16 W
20	20 W
30	30 W

Tolerance (seventh digit)

F	±1 %
G	±2 %
J	±5 %
K	±10 %
M	±20 %
S	+20/−10%

Assistant code (twelfth digit)

A	Small type
B	Small type
S	Small type
Y	Lead tapping
Z	Lead tapping

Values (eighth — tenth or eleventh digits)

examples:

R47		0.47 Ω
4R7		4.7 Ω
470	47×10^{0}	47 Ω
471	47×10^{1}	470 Ω
472	47×10^{2}	4.7 kΩ
473	47×10^{3}	47 kΩ
474	47×10^{4}	470 kΩ
475	47×10^{5}	4.7 MΩ

QRV resistance shown by four digits:

4640	464×10^{0}	464 Ω
4641	464×10^{1}	4.64 kΩ
4642	464×10^{2}	46.4 kΩ

Shape of resistor (sixth digit)

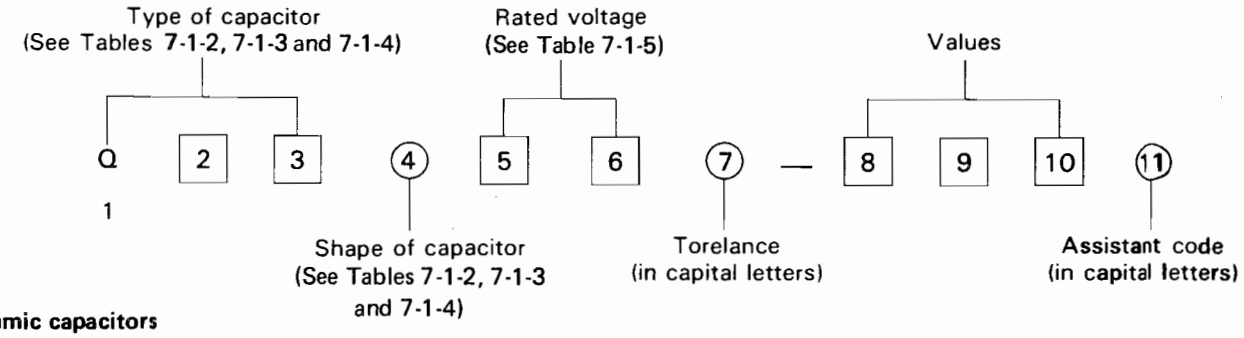
Note: ■ indicates flame retardant resistor.

Shape of resistor \ Type of resistor	C	D	F	G	H	M	S	V	W	X
1										
2										
3										
4										
5									(L) type	
6										
7			Lug (B) type							
8			Lug (A) type				Chip			
9			Lug (C) type							

Table 7-1-1

7.1.2 Fixed capacitor coding

Fixed capacitor part numbers are as follows.



Ceramic capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Mono-direction	Kink lead	Axial straight lead	Axial forming lead	Chip
QCB	Ceramic			B	C	
QCC	Ceramic	1	3	4	5	
QCD	High capacitance			B		8,A
QCF	High capacitance	1,4	3	B		8,A
QCS	Temperature compensation	1	3	4,B	5,C	8,A
QCT	Temperature compensation	Special coding				8,A
QCV	Ceramic			1,B	3,C	
QCX	Ceramic			1,B	3,C	
QCY	High capacitance	1,4,5	3	6	7	8,A
QCZ	Special type	Special coding				

Table 7-1-2

Electrolytic capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
Symbol	Characteristics	Tubular	Mono-direction	Anti-stress	Forming	Snap-in
QEB	Low leakage		4	5	6	
QEC	Low leakage		4,8,A	5,B	6,C	9
QED	Miniature type		4	5	6	
QEE	Tantalum (normal)		4	5	6	
	Tantalum (small)		8			
QEF	Chip tantalum	8 (chip type)				
QEG	Low impedance		4			
QEK	Miniature type (ϕ5)		4,A	5,B	6,C	7
QEL	Small type				6	7
QEM	Small type		4,A	5,B	6,C	
QEN	Non-polar	2	4	5	6	7
QEP	Non-polar (small)	2	4,A	5,B	6,C	7
QER	Miniature type		4	5	6	7
QET	Normal	2	4,A	5,B	6,C	7
QEU	Small type		4	5	6	7
QEV	Small type		4	5	6	7
QEW	Normal	2	4	5	6	7
QEZ	Special type	Special coding				

Table 7-1-3

Paper film capacitors

Type of capacitor (first – third digits)		Shape of capacitor (fourth digit)				
		Tubular	Normal		Flame retardant	
Symbol	Characteristics		Mono-direction	Kink lead	Mono-direction	Kink lead
QFA	Metalized polypropylene	2	7			
QFE	Metalized mylar				5	
QFF	Film mica		4			
QFG	Polypropylene		4	8		
QFH	Metalized mylar	2	4,7,9	3,8	5	6
QFJ	Mylar (special)		4			
QFK	Metalized mylar (small)				5	
QFM	Mylar	2	4	3,7,8	5	6
QFN	Mylar (small)		4	3,8		
QFP	Polypropylene		4	3,8		
QFS	Polystyrole	2	4	3,8		
QFV	Thin film		4	7,8		
QFZ	Special type	Special coding				

Table 7-1-4

Rated voltage (fifth and sixth digits)

Fifth digit \ Sixth digit	A	B	C	D	E	F	G	H	J	K	P	V	W	X
0						3.15	4.0	5(5.5)	6.3					
1	10	12	16	20	25		40	50	63	80		35		
2	100	125	160	200	250	315	400	500	630	800	180	350	450	600
3	1000	1250		2000				5000						

Table 7-1-5

Tolerance (seventh digit)

A	$^{+100}_{-10}$ %	M	± 20 %
F	± 1 %	N	± 30 %
G	± 2 %	P	$^{+100}_{-0}$ %
H	$^{+50}_{-10}$ %	R	$^{+30}_{-10}$ %
J	± 5 %	X	$^{+40}_{-20}$ %
K	± 10 %	Z	$^{+80}_{-20}$ %

Values (eighth – tenth digits)

Example : Values are in picofarads

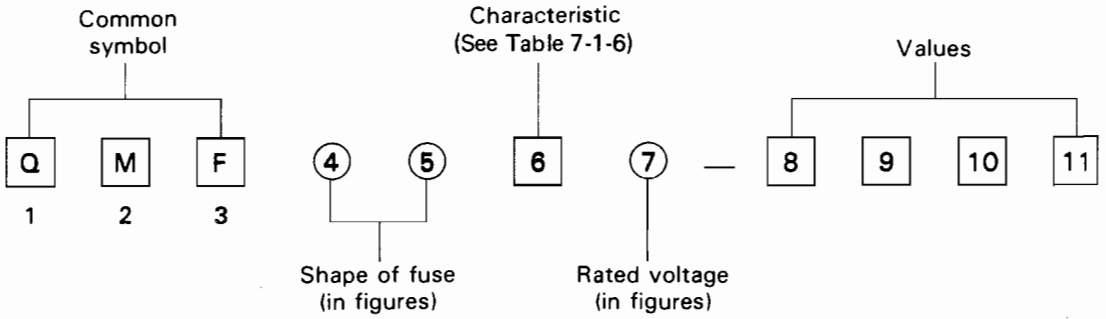
R10	.....	0.1 pF
1R0	.....	1.0 pF
100	..... 10×10^{0}pF	10 pF
101	..... 10×10^{1} pF	100 pF
102	..... 10×10^{2} pF	1,000 pF (0.001 μF)
103	..... 10×10^{3} pF	10,000 pF (0.01 μF)
104	..... 10×10^{4} pF	100,000 pF (0.1 μF)
105	..... 10×10^{5} pF	1 μF
106	..... 10×10^{6} pF	10 μF

Assistant code (eleventh digit)

A	Small size	X	Tapping
G	Small size	Y	Lead tapping
W	Tapping or Forming	Z	Lead tapping

7.1.3 Fuse coding

Standard fuse part numbers are as follows.



Shape of fuse
(fourth and fifth digits)

51	ϕ5.2×20 mm
53	ϕ5.2×20 mm with lead wires
60	ϕ6.4×30 mm
61	ϕ6.35×31.8 mm
63	ϕ6.4×30 mm with lead wires
66	ϕ6.35×31.8 mm with lead wires
00	Special type

Rated voltage
(seventh digit)

1	AC125 V
2	AC250 V

Values
(eighth-tenth or eleventh digits)
example:

R315	..... 0.315 A
R63	..... 0.63 A
1R0	..... 1.0 A
1R25	..... 1.25 A
2R5	..... 2.5 A
100	..... 10 A

Characteristics (sixth digit)

Symbol	Fusing Current	Fusing Time	Remarks
A	210 %	Within 2 min.	Anti-rush type (for CB and SEMKO)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
B	210 %	Within 30 min.	Regular fusible type (for SEMKO and CB)
	275 %	0.05 – 2 sec.	
	400 %	0.01 – 0.3 sec.	
C	135 %	Within 1 hr.	Regular fusible type (for UL, CSA and Japan)
	200 %	Within 2 min.	
E	210 %	Within 2 min.	Anti-rush type (for Europe)
	275 %	0.6 – 10 sec.	
	400 %	0.15 – 3 sec.	
	1000 %	0.02 – 0.3 sec.	
J	135 %	Within 1 hr.	Anti-rush type (for UL, CSA and Japan)
	200 %	Within 2 min.	
M	135 %	Within 1 hr.	Regular fusible type (for UL and CSA)
	200 %	Within 2 min.	
R	160 %	Within 1 hr.	Regular fusible type (for Japan)
	200 %	Within 2 min.	
S	135 %	Within 1 hr.	Anti-rush type (for Japan)
	200 %	Within 2 min.	
U	135 %	Within 1 hr.	Anti-rush type (for UL and CSA)
	200 %	Within 2 min.	

Table 7-1-6

6. MAIN BOARD ASSEMBLY <01>

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	PWBA	YB10037C-02	MAIN BOARD ASSY
	IC1	S-81252HG	IC
	IC2	M5236ML	IC
	IC101	BU3767K	IC
	IC102	M52434FP	IC
	IC103	M52410FP	IC
	IC104	VC5026G	IC
	IC105	BA226F	IC
	IC106	NJM2904E	IC
	OR	LM2904E	IC
	IC301	BA7757BK	IC
	IC302	NJM2904E	IC
	OR	LM2904E	IC
	IC401	M37412M4-004FP	IC
	OR	M37412E5-003FP	IC
	IC402	S-8054HN	IC
	IC403	BU4584BF	IC
	IC404	M54543ASL	IC
	Q1	2SB1009(PQ)	TRANSISTOR
	Q3	DTC144EU	TRANSISTOR
	Q4	2SJ146	FE TRANSISTOR
	Q5	2SJ146	FE TRANSISTOR
	Q101	DTA124EU	TRANSISTOR
	Q102	2SK665	FE TRANSISTOR
	Q103	2SC4081(QRS)	TRANSISTOR
	Q104	DTC144EU	TRANSISTOR
	Q105	DTC144EU	TRANSISTOR
	Q106	DTC144EU	TRANSISTOR
	Q107	DTC144EU	TRANSISTOR
	Q108	DTC144EU	TRANSISTOR
	Q109	DTC144EU	TRANSISTOR
	Q110	DTC144EU	TRANSISTOR
	Q111	2SK665	FE TRANSISTOR
	Q112	2SB798(MLK)	TRANSISTOR
	Q113	2SB798(MLK)	TRANSISTOR
	Q114	2SB798(MLK)	TRANSISTOR
	Q115	FMG2	TRANSISTOR
	Q116	DTC144EU	TRANSISTOR
	Q301	DTC144EU	TRANSISTOR
	Q302	DTA124EU	TRANSISTOR
	Q303	FMW3	TRANSISTOR
	Q304	2SC4097(QR)	TRANSISTOR
	Q305	2SC4097(QR)	TRANSISTOR
	Q306	2SA1036K(QR)	TRANSISTOR
	Q307	2SA1036K(QR)	TRANSISTOR
	Q308	DTC144EU	TRANSISTOR
	Q309	DTC144EU	TRANSISTOR
	Q310	DTC144EU	TRANSISTOR
	Q313	DTC144EU	TRANSISTOR
	Q401	2SA1576(QRS)	TRANSISTOR
	Q402	2SC4081(QRS)	TRANSISTOR
	Q403	2SK665	FE TRANSISTOR
	Q404	2SK665	FE TRANSISTOR
	Q405	DTA124EU	TRANSISTOR
	Q406	2SA1576(QRS)	TRANSISTOR
	Q407	2SA1576(QRS)	TRANSISTOR
	Q420	2SA1576(QRS)	TRANSISTOR
	Q421	2SA1576(QRS)	TRANSISTOR
	Q422	2SA1576(QRS)	TRANSISTOR
	Q423	FMG2	TRANSISTOR
	D2	FMN1	DIODE
	D101	RD8.2MB2	ZENER DIODE
	OR	RD8.2MB1	ZENER DIODE
	DR	RD8.2MB3	ZENER DIODE
	D102	DA204U	DIODE
	D103	MA141WK	DIODE
	D104	RB451F	DIODE
	D105	MA141WK	DIODE
	D106	MA141WK	DIODE
	D401	DA204U	DIODE
	D402	DAN202U	DIODE
	D403	DAP202U	DIODE
	D405	RD6.8MB1	ZENER DIODE
	OR	RD6.8MB3	ZENER DIODE
	OR	RD6.8MB2	ZENER DIODE
	D406	RB451F	DIODE
	R1	NRSA63J-221N	RESISTOR
	R3	NRSA63J-822N	RESISTOR
	R4	NVP1301-102N	V RESISTOR,REG 8V
	R15	NRSA63J-123N	RESISTOR
	R17	NRSA63J-105N	RESISTOR
	R19	NRSA63J-102N	RESISTOR
	R20	NRSA63J-824N	RESISTOR
	R21	NRSA63J-105N	RESISTOR
	R22	NRSA63J-824N	RESISTOR
	R101	YU40174-1-1	V RESISTOR,TRACKING
	R102	NRSA63J-102N	RESISTOR
	R103	NVP1301-103N	V RESISTOR,TRACKING PRESET
	R104	NRSA63J-102N	RESISTOR
	R105	NRSA63J-103N	RESISTOR
	R106	NVP1301-474N	V RESISTOR, EP CTL DLY
	R107	NRSA63J-333N	RESISTOR
	R108	NVP1301-474N	V RESISTOR,PB SW POINT
	R109	NRSA63J-273N	RESISTOR
	R110	NRSA63J-392N	RESISTOR
	R114	NRSA63J-102N	RESISTOR
	R115	NRSA63J-105N	RESISTOR
	R116	NRSA63J-222N	RESISTOR
	R117	NRSA63J-104N	RESISTOR
	R118	NRSA63J-104N	RESISTOR
	R119	NRSA63J-104N	RESISTOR
	R120	NRSA63J-104N	RESISTOR
	R121	NRSA63J-473N	RESISTOR
	R122	NRSA63J-102N	RESISTOR
	R123	NRSA63J-273N	RESISTOR
	R124	NRSA63J-102N	RESISTOR
	R125	NRSA63J-102N	RESISTOR
	R126	NRSA63J-102N	RESISTOR
	R127	NRSA63J-102N	RESISTOR
	R128	NRSA63J-102N	RESISTOR
	R129	NRSA63J-102N	RESISTOR
	R130	NRSA63J-473N	RESISTOR
	R131	NRSA63J-473N	RESISTOR
	R133	NRSA63J-273N	RESISTOR
	R135	NRSA63J-392N	RESISTOR
	R136	NRSA63J-682N	RESISTOR
	R137	NRSA63J-223N	RESISTOR
	R138	NRSA63J-683N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R139	NRSA63J-105N	RESISTOR
	R140	NRSA63J-154N	RESISTOR
	R141	NRSA63J-184N	RESISTOR
	R145	NRSA63J-333N	RESISTOR
	R146	NRSA63J-224N	RESISTOR
	R147	NRSA63J-105N	RESISTOR
	R148	NRSA63J-154N	RESISTOR
	R149	NRSA63J-184N	RESISTOR
	R150	NRSA63J-103N	RESISTOR
	R151	NRSA63J-471N	RESISTOR
	R152	NRSA63J-103N	RESISTOR
	R153	NRSA63J-394N	RESISTOR
	R154	NRSA63J-334N	RESISTOR
	R155	NRSA63J-103N	RESISTOR
	R156	NRSA63J-224N	RESISTOR
	R158	NRSA63J-561N	RESISTOR
	R159	NRSA63J-561N	RESISTOR
	R160	NRSA63J-332N	RESISTOR
	R161	NRSA63J-332N	RESISTOR
	R162	NRSA63J-332N	RESISTOR
	R163	NRSA63J-332N	RESISTOR
	R164	NRSA63J-102N	RESISTOR
	R165	NRSA63J-102N	RESISTOR
	R166	NRSA63J-102N	RESISTOR
	R167	NRSA63J-102N	RESISTOR
	R168	NRSA63J-223N	RESISTOR
	R169	NRSA63J-183N	RESISTOR
	R170	NRSA63J-473N	RESISTOR
	R171	NRSA63J-105N	RESISTOR
	R172	NRSA63J-103N	RESISTOR
	R173	NRSA63J-473N	RESISTOR
	R174	NRSA63J-153N	RESISTOR
	R175	NRSA63J-472N	RESISTOR
	R176	NRSA63J-474N	RESISTOR
	R177	NRSA63J-103N	RESISTOR
	R178	NRSA63J-0R0A	RESISTOR
	R180	NRSA63J-560N	RESISTOR
	R181	NRSA63J-560N	RESISTOR
	R182	NRSA63J-683N	RESISTOR
	R183	NRSA63J-183N	RESISTOR
	R184	NRSA63J-103N	RESISTOR
	R185	NRSA63J-103N	RESISTOR
	R186	NRSA63J-103N	RESISTOR
	R190	NRSA63J-334N	RESISTOR
	R191	NRSA63J-333N	RESISTOR
	R196	NRSA63J-473N	RESISTOR
	R197	NRSA63J-473N	RESISTOR
	R198	NRSA63J-220N	RESISTOR
	R301	NRSA63J-302N	RESISTOR
	R302	NRSA63J-623N	RESISTOR
	R303	NRSA63J-681N	RESISTOR
	R304	NRSA63J-102N	RESISTOR
	R305	NRSA63J-100N	RESISTOR
	R306	NRSA63J-222N	RESISTOR
	R307	NRSA63J-103N	RESISTOR
	R308	NRSA63J-392N	RESISTOR
	R309	NVP1301-103N	V RESISTOR,PB AUDIO LEVEL
	R311	NRSA63J-124N	RESISTOR
	R312	NRSA63J-121N	RESISTOR
	R313	NRSA63J-223N	RESISTOR
	R314	NRSA63J-470N	RESISTOR
	R315	NRSA63J-185N	RESISTOR
	R316	NRSA63J-822N	RESISTOR
	R317	NRSA63J-223N	RESISTOR
	R318	NRSA63J-223N	RESISTOR
	R320	NRSA63J-121N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R321	NRSA63J-152N	RESISTOR
	R322	NRSA63J-221N	RESISTOR
	R323	NRSA63J-273N	RESISTOR
	R324	NRSA63J-102N	RESISTOR
	R325	NRSA63J-0R0A	RESISTOR
	R326	NRSA63J-133N	RESISTOR
	R327	NRSA63J-123N	RESISTOR
	R328	NRSA63J-123N	RESISTOR
	R329	NRSA63J-123N	RESISTOR
	R330	NRSA63J-562N	RESISTOR
	R331	NRSA63J-272N	RESISTOR
	R332	NRSA63J-221N	RESISTOR
	R333	NRSA63J-124N	RESISTOR
	R334	NRSA63J-124N	RESISTOR
	R335	NRSA63J-4R7N	RESISTOR
	R336	NRSA63J-4R7N	RESISTOR
	R338	NRSA63J-221N	RESISTOR
	R339	NRSA63J-221N	RESISTOR
	R340	NRSA63J-0R0A	RESISTOR
	R341	NRSA63J-0R0A	RESISTOR
	R342	NVP1301-473N	V RESISTOR, AUDIO BIAS LEVEL
	R345	NRSA63J-103N	RESISTOR
	R346	NRSA63J-103N	RESISTOR
	R347	NRSA63J-470N	RESISTOR
	R348	NRSA63J-562N	RESISTOR
	R349	NRVA62D-104N	RESISTOR
	R351	NRSA63J-472N	RESISTOR
	R352	NRVA62D-104N	RESISTOR
	R353	NRVA62D-513N	RESISTOR
	R355	NRSA63J-331N	RESISTOR
	R358	NRVA62D-513N	RESISTOR
	R359	NRVA62D-243N	RESISTOR
	R361	NRSA63J-331N	RESISTOR
	R362	NRSA63J-472N	RESISTOR
	R363	NRVA62D-513N	RESISTOR
	R365	NRSA63J-103N	RESISTOR
	R366	NRSA63J-221N	RESISTOR
	R368	NRSA63J-103N	RESISTOR
	R372	NRSA63J-0R0A	RESISTOR
	R373	NRSA63J-0R0A	RESISTOR
	R401	NRSA63J-105N	RESISTOR
	R402	NRSA63J-153N	RESISTOR
	R403	NRSA63J-102N	RESISTOR
	R404	NRSA63J-472N	RESISTOR
	R405	NRSA63J-103N	RESISTOR
	R406	NRSA63J-472N	RESISTOR
	R407	NRSA63J-104N	RESISTOR
	R408	NRSA63J-473N	RESISTOR
	R409	NRSA63J-102N	RESISTOR
	R410	NRSA63J-103N	RESISTOR
	R411	NRSA63J-102N	RESISTOR
	R412	NRSA63J-103N	RESISTOR
	R413	NRSA63J-102N	RESISTOR
	R414	NRSA63J-333N	RESISTOR
	R415	NRSA63J-102N	RESISTOR
	R416	NRSA63J-823N	RESISTOR
	R417	NRSA63J-102N	RESISTOR
	R418	NRSA63J-103N	RESISTOR
	R419	NRSA63J-102N	RESISTOR
	R420	NRSA63J-203N	RESISTOR
	R421	NRSA63J-203N	RESISTOR
	R422	NRSA63J-203N	RESISTOR
	R423	NRSA63J-103N	RESISTOR
	R424	NRSA63J-103N	RESISTOR
	R425	NRSA63J-203N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R426	NRSA63J-153N	RESISTOR
	R427	NRSA63J-102N	RESISTOR
	R428	NRSA63J-105N	RESISTOR
	R429	NRSA63J-102N	RESISTOR
	R430	NRSA63J-563N	RESISTOR
	R431	NRSA63J-472N	RESISTOR
	R432	NRSA63J-203N	RESISTOR
	R433	NRSA63J-203N	RESISTOR
	R434	NRSA63J-203N	RESISTOR
	R435	NRSA63J-103N	RESISTOR
	R436	NRSA63J-103N	RESISTOR
	R437	NRSA63J-203N	RESISTOR
	R438	NRSA63J-102N	RESISTOR
	R439	NRSA63J-102N	RESISTOR
	R440	NRVA62D-683N	RESISTOR
	R441	NRVA62D-103N	RESISTOR
	R442	NRVA62D-683N	RESISTOR
	R443	QRSA08J-0R0Y	RESISTOR
	R444	NRSA63J-153N	RESISTOR
	R445	NRSA63J-102N	RESISTOR
	R446	NRSA63J-153N	RESISTOR
	R447	NRSA63J-102N	RESISTOR
	R448	NRSA63J-104N	RESISTOR
	R449	NRSA63J-0R0A	RESISTOR
	R450	NRSA63J-103N	RESISTOR
	R451	NRSA63J-471N	RESISTOR
	R452	NRSA63J-153N	RESISTOR
	R453	NRSA63J-102N	RESISTOR
	R454	NRSA63J-153N	RESISTOR
	R455	NRSA63J-102N	RESISTOR
	R456	NRSA63J-102N	RESISTOR
	R457	NRSA63J-473N	RESISTOR
	R458	NRSA63J-273N	RESISTOR
	R460	NRSA63J-0R0A	RESISTOR
	R461	NRSA63J-102N	RESISTOR
	R462	NRSA63J-102N	RESISTOR
	R463	NRSA63J-102N	RESISTOR
	R464	NRSA63J-271N	RESISTOR
	R465	NRSA63J-332N	RESISTOR
	R466	NRSA63J-152N	RESISTOR
	R467	NRSA63J-392N	RESISTOR
	R468	NRSA63J-473N	RESISTOR
	R469	NRSA63J-473N	RESISTOR
	R470	NRSA63J-103N	RESISTOR
	R471	NRSA63J-103N	RESISTOR
	R472	NRSA63J-103N	RESISTOR
	R473	NRSA63J-153N	RESISTOR
	R474	NRSA63J-473N	RESISTOR
	R475	NRSA63J-473N	RESISTOR
	R476	NRSA63J-105N	RESISTOR
	R477	NRSA63J-102N	RESISTOR
	R478	NRSA63J-472N	RESISTOR
	R479	NRSA63J-472N	RESISTOR
	R480	NRSA63J-105N	RESISTOR
	R482	NRSA63J-223N	RESISTOR
	R485	NRSA63J-103N	RESISTOR
	R489	NRSA63J-105N	RESISTOR
	R491	NRSA63J-102N	RESISTOR
	R501	NRSA63J-102N	RESISTOR
	R502	NRSA63J-102N	RESISTOR
	R504	NRSA63J-153N	RESISTOR
	R505	NRSA63J-103N	RESISTOR
	R506	NRSA63J-103N	RESISTOR
	R507	NRSA63J-472N	RESISTOR
	R508	NRSA63J-102N	RESISTOR
	R509	NRSA63J-103N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R510	NRSA63J-152N	RESISTOR
	R511	NRSA63J-332N	RESISTOR
	R512	NRSA63J-103N	RESISTOR
	R514	NRSA63J-0R0A	RESISTOR
	R516	NRSA63J-153N	RESISTOR
	B101	NRSA63J-0R0A	RESISTOR
	B102	NRSA63J-0R0A	RESISTOR
	B103	NRSA63J-0R0A	RESISTOR
	B110	NRSA63J-0R0A	RESISTOR
	C1	QEKA1CM-476	E CAPACITOR
	C2	QEKA1CM-476	E CAPACITOR
	C3	QEDF1CM-476	E CAPACITOR
	OR	QED41CM-476	E CAPACITOR
	C4	QEDF1CM-476	E CAPACITOR
	OR	QED41CM-476	E CAPACITOR
	C5	QEDF1AM-826	E CAPACITOR
	OR	QED41AM-826	E CAPACITOR
	C6	QEDF1AM-826	E CAPACITOR
	OR	QED41AM-826	E CAPACITOR
	C7	QEDF1AM-826	E CAPACITOR
	OR	QED41AM-826	E CAPACITOR
	C8	QCY81EK-473ZL	CAPACITOR
	OR	QCY81EK-473	CAPACITOR
	C9	QEDF1AM-826	E CAPACITOR
	OR	QED41AM-826	E CAPACITOR
	C10	QCFA1EZ-104	CAPACITOR
	C15	QEF81EM-474	TANTAL CAPACITOR
	C16	QEEF1DM-226	TANTAL CAPACITOR
	OR	QEE81DM-226	TANTAL CAPACITOR
	C17	QEE41EM-225	TANTAL CAPACITOR
	C18	QEE41EM-225	TANTAL CAPACITOR
	C101	QFZ9011-473Z	MM CAPACITOR
	C102	QFZ9011-683Z	MM CAPACITOR
	C103	NCB31HK-392A	CAPACITOR
	C104	NCT06CH-270A	CAPACITOR
	C105	NCT06CH-270A	CAPACITOR
	C107	QERF1CM-106	E CAPACITOR
	C108	QCF81CZ-105	CAPACITOR
	C109	NCB31EK-103A	CAPACITOR
	C110	NCB31HK-562A	CAPACITOR
	C111	NCB31EK-103A	CAPACITOR
	C112	NCB31HK-102A	CAPACITOR
	C115	NCB31HK-222A	CAPACITOR
	C116	QFZ9011-104Z	MM CAPACITOR
	C117	QENF1CM-106	NP E.CAP
	C120	NCB31HK-222A	CAPACITOR
	C121	QFZ0096-224Z	MM CAPACITOR
	C122	QENF1CM-106	NP E.CAP
	C123	QCSA1HJ-102	CAPACITOR
	C124	QCSA1HJ-102	CAPACITOR
	C125	NCB31EK-103A	CAPACITOR
	C130	QCFA1EZ-104	CAPACITOR
	C136	QCF81CZ-105	CAPACITOR
	C137	QCF81CZ-105	CAPACITOR
	C138	NCB31HK-102A	CAPACITOR
	C140	NCF31CZ-104A	CAPACITOR
	C141	NCS31HJ-100A	CAPACITOR
	C142	NCF31CZ-104A	CAPACITOR
	C143	NCB31HK-102A	CAPACITOR
	C144	NCB31HK-471A	CAPACITOR
	C145	NCB31HK-102A	CAPACITOR
	C146	NCF31CZ-104A	CAPACITOR
	C148	NCB31HK-562A	CAPACITOR
	C149	QCF81CZ-105	CAPACITOR
	C150	QCF81CZ-105	CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	C151	NCS31HJ-101A	CAPACITOR
	C155	NCB31EK-103A	CAPACITOR
	C156	NCB31EK-103A	CAPACITOR
	C157	QERF1AM-336	E CAPACITOR
	C158	QERF1AM-336	E CAPACITOR
	C159	QERF1AM-336	E CAPACITOR
	C160	QCF81CZ-105	CAPACITOR
	C161	QCYA1EK-223	CAPACITOR
	C162	QCYA1EK-223	CAPACITOR
	C163	QCYA1EK-223	CAPACITOR
	C165	QFZ9011-333Z	MM CAPACITOR
	C166	QCF81CZ-105	CAPACITOR
	C301	QERF1HM-474	E CAPACITOR
	C302	QERF1HM-474	E CAPACITOR
	C303	QERF1CM-106	E CAPACITOR
	C304	QERF1HM-224	E CAPACITOR
	C306	QERF0JM-336	E CAPACITOR
	C307	QERF1AM-226	E CAPACITOR
	C308	QCYA1EK-223	CAPACITOR
	C309	NCB31HK-681A	CAPACITOR
	C310	NCB31HK-272A	CAPACITOR
	C311	QERF1HM-105	E CAPACITOR
	C312	QERF0JM-336	E CAPACITOR
	C313	QENF0JM-226	NP E.CAP
	C314	QER41HM-105	E CAPACITOR
	C315	QERF1CM-106	E CAPACITOR
	C316	QERF1CM-106	E CAPACITOR
	C318	QER40JM-226	E CAPACITOR
	C319	QFJ41HJ-333	M CAPACITOR
	C320	QERF1HM-105	E CAPACITOR
	C322	NCB31HK-471A	CAPACITOR
	C323	NCB31HK-682A	CAPACITOR
	C324	NCB31HK-682A	CAPACITOR
	C325	QFZ9011-333Z	MM CAPACITOR
	C326	QERF1AM-476	E CAPACITOR
	C330	NCR31CK-223A	CAPACITOR
	C331	NCB31HK-182A	CAPACITOR
	C332	NCB31HK-472A	CAPACITOR
	C334	NCB31HK-682A	CAPACITOR
	C336	NCB31HK-682A	CAPACITOR
	C337	NCB31HK-332A	CAPACITOR
	C338	NCS31HJ-221A	CAPACITOR
	C340	NCT08CH-101A	CAPACITOR
	C341	NCT08CH-101A	CAPACITOR
	C342	NCT08CH-101A	CAPACITOR
	C343	NCT08CH-101A	CAPACITOR
	C344	NCT08CH-101A	CAPACITOR
	C345	NCT08CH-101A	CAPACITOR
	C346	NCT08CH-101A	CAPACITOR
	C347	NCT08CH-101A	CAPACITOR
	C401	QERF1EM-475	E CAPACITOR
	C402	QCFA1EZ-104	CAPACITOR
	C403	QER41EM-475	E CAPACITOR
	C404	NCS31HJ-330A	CAPACITOR
	C405	NCS31HJ-330A	CAPACITOR
	C407	NCB31HK-332A	CAPACITOR
	C408	NCB31HK-472A	CAPACITOR
	C409	QCFA1EZ-333	CAPACITOR
	C411	NCB31EK-103A	CAPACITOR
	C412	QEF81CM-335	E CAPACITOR
	C414	QCYA1HK-103	CAPACITOR
	C415	YU40470-103	CAPACITOR
	OR	QCVB1CM-103	CAPACITOR
	L1	PU56181-470	COIL
	L2	PU56181-470	COIL
	L3	YU40248-470KY	COIL
	L302	PU56197-2	EQUALIZER
⚠	L303	YU41077	BIAS OSC COIL
	L304	PU59188-221K	COIL
	L401	YU40248-470KY	COIL
⚠	CF401	YU40560	CRYSTAL RESONATOR
⚠	X1	PU58331	CRYSTAL RESONATOR
⚠	OR	PU58849	CRYSTAL RESONATOR
	DD1	YU40169-03	DC-DC CONVERTER
	TRAP101	AFZ74A001X1	TRAP
	CL1	YU40245-02	WIRE CLAMP
	HS1	YU40466-1-3	HEAT SINK
	SCW1	YQ40578	SCREW
	SLD1	YQ41150	SHIELD PLATE
	SLD2	YQ40890	SHEET
	SLD3	YU40467	INSULATOR
	WR1	YU40705-03	WIRE
	TP1	YU40581-AY	CHIP TP(2125)
	TP2	YU40581-AY	CHIP TP(2125)
	TP3	YU40581-AY	CHIP TP(2125)
	TP4	PU54983	TEST PIN
	TP5	PU54983	TEST PIN
	TP101	YU40581-AY	CHIP TP(2125)
	TP104	YU40581-AY	CHIP TP(2125)
	TP105	YU40581-AY	CHIP TP(2125)
	TP106	YU40581-AY	CHIP TP(2125)
	TP107	YU40581-AY	CHIP TP(2125)
	TP108	YU40581-AY	CHIP TP(2125)
	TP109	YU40581-AY	CHIP TP(2125)
	TP110	YU40581-AY	CHIP TP(2125)
	TP111	YU40581-AY	CHIP TP(2125)
	TP302	YU40581-AY	CHIP TP(2125)
	TP303	YU40581-AY	CHIP TP(2125)
	TP304	YU40581-AY	CHIP TP(2125)
	CN1	YU40101-12	CAP HOUSING,(BOARD TO BOARD)
	CN2	YU40108-6	CAP HOUSING
	CN3	YU40773-14	CAP HOUSING,(BOARD TO BOARD)
	CN4	YU40683-16	CAP HOUSING,(BOARD TO BOARD)
	CN5	YU40096-4	CAP HOUSING
	CN6	YU40106-13	CAP HOUSING
	CN7	YU40106-10	CAP HOUSING
	CN8	YU40096-7	CAP HOUSING
	CN9	YU40096-6	CAP HOUSING
	CN10	YU40096-7	CAP HOUSING
	CN11	YU40096-3Y	CAP HOUSING
	CN12	YU40096-3	CAP HOUSING
	CN13	YU40096-9	CAP HOUSING
	CN14	YU40108-15	CAP HOUSING
	CN15	YU40102-14	CAP HOUSING,(BOARD TO BOARD)
	CN16	YU40102-8	CAP HOUSING,(BOARD TO BOARD)
	CN17	YU40102-10	CAP HOUSING,(BOARD TO BOARD)
⚠	CP1	ICP-F15	CIRCUIT PROTECTOR
⚠	CP2	ICP-F15	CIRCUIT PROTECTOR
⚠	CP3	ICP-F15	CIRCUIT PROTECTOR
⚠	CP4	ICP-F15	CIRCUIT PROTECTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
⚠	CP5	ICP-F20	CIRCUIT PROTECTOR

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* 7. Y/C BOARD ASSEMBLY <02> *
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	PWBA	YB10040A-01	Y/C BOARD ASSY
	IC1	BA7288K	IC
	IC2	MSM6964-3MS	IC
	IC3	LA7316	IC
	IC4	AN8009	IC
	Q1	2SC4081(QRS)	TRANSISTOR
	Q2	2SC4081(QRS)	TRANSISTOR
	Q4	2SA1576	TRANSISTOR
	Q5	2SC4081	TRANSISTOR
	Q6	2SC4081(QRS)	TRANSISTOR
	Q7	DTC144EU	TRANSISTOR
	Q11	2SC4081(QRS)	TRANSISTOR
	Q12	2SA1576(QRS)	TRANSISTOR
	Q13	DTC144EU	TRANSISTOR
	Q14	2SA1576(QRS)	TRANSISTOR
	Q15	2SC4081(QRS)	TRANSISTOR
	Q20	2SA1577	TRANSISTOR
	Q21	2SA1577	TRANSISTOR
	Q22	2SA1577	TRANSISTOR
	Q23	2SB624-T2BBV4	TRANSISTOR
	Q24	DTC144EU	TRANSISTOR
	Q25	DTA144EU	TRANSISTOR
	Q26	2SK665	FE TRANSISTOR
	Q28	DTC144EU	TRANSISTOR
	Q30	2SC4081(QRS)	TRANSISTOR
	D1	DAN202U	DIODE
	D2	DAN202U	DIODE
	D3	DAN202U	DIODE
	D4	DAN202U	DIODE
	D5	DAN202U	DIODE
	D6	DAN202U	DIODE
	D7	DAN202U	DIODE
	D9	DAN202U	DIODE
	D10	DA204U	DIODE
	D11	DA204U	DIODE
	D12	1SS133	DIODE
	R1	NRSA63J-822N	RESISTOR
	R2	NRSA63J-822N	RESISTOR
	R3	NRSA63J-821N	RESISTOR
	R4	NRSA63J-102N	RESISTOR
	R5	NRSA63J-122N	RESISTOR
	R6	NRSA63J-821N	RESISTOR
	R7	NRSA63J-122N	RESISTOR
	R8	NRSA63J-681N	RESISTOR
	R9	NRSA63J-331N	RESISTOR
	R10	NRSA63J-102N	RESISTOR
	R13	NRSA63J-102N	RESISTOR
	R14	NRSA63J-222N	RESISTOR
	R15	NRSA63J-222N	RESISTOR
	R16	NRSA63J-391N	RESISTOR
	R17	NRSA63J-152N	RESISTOR
	R18	NRSA63J-391N	RESISTOR
	R19	NRSA63J-562N	RESISTOR
	R20	NRSA63J-122N	RESISTOR
	R21	NRSA63J-122N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R22	NRSA63J-681N	RESISTOR
	R23	NRSA63J-561N	RESISTOR
	R24	NRSA63J-152N	RESISTOR
	R25	NRSA63J-821N	RESISTOR
	R26	NRSA63J-0R0A	RESISTOR
	R34	NRSA63J-472N	RESISTOR
	R35	NRSA63J-102N	RESISTOR
	R36	NRSA63J-333N	RESISTOR
	R37	NRSA63J-153N	RESISTOR
	R38	NRSA63J-102N	RESISTOR
	R39	NRSA63J-152N	RESISTOR
	R40	NRSA63J-272N	RESISTOR
	R41	NRSA63J-681N	RESISTOR
	R42	NRSA63J-203N	RESISTOR
	R43	NRSA63J-103N	RESISTOR
	R44	NRSA63J-152N	RESISTOR
	R45	NRSA63J-222N	RESISTOR
	R46	NRSA63J-182N	RESISTOR
	R47	NRSA63J-123N	RESISTOR
	R48	NRSA63J-153N	RESISTOR
	R49	NRSA63J-273N	RESISTOR
	R50	NRSA63J-103N	RESISTOR
	R51	NRSA63J-222N	RESISTOR
	R52	NRSA63J-102N	RESISTOR
	R53	NRSA63J-563N	RESISTOR
	R54	QRSA08J-152YN	RESISTOR
	R55	NRSA63J-102N	RESISTOR
	R56	NRSA63J-102N	RESISTOR
	R57	NRSA63J-104N	RESISTOR
	R58	NRSA63J-122N	RESISTOR
	R59	NRSA63J-561N	RESISTOR
	R60	NRSA63J-824N	RESISTOR
	R61	NRSA63J-0R0A	RESISTOR
	R62	NRSA63J-273N	RESISTOR
	R64	NRSA63J-122N	RESISTOR
	R65	NRSA63J-102N	RESISTOR
	R66	NRSA63J-102N	RESISTOR
	R67	NRSA63J-561N	RESISTOR
	R70	NRSA63J-271N	RESISTOR
	R71	NRSA63J-102N	RESISTOR
	R72	NRSA63J-102N	RESISTOR
	R73	NRSA63J-151N	RESISTOR
	R74	NRSA63J-332N	RESISTOR
	R75	NRSA63J-151N	RESISTOR
	R76	NRSA63J-102N	RESISTOR
	R77	NRSA63J-122N	RESISTOR
	R81	NRSA63J-223N	RESISTOR
	R82	NRSA63J-822N	RESISTOR
	R84	NRSA63J-472N	RESISTOR
	R85	NRSA63J-104N	RESISTOR
	R88	NRSA63J-681N	RESISTOR
	R90	NRSA63J-152N	RESISTOR
	R91	NRSA63J-332N	RESISTOR
	R92	NRSA63J-152N	RESISTOR
	R93	NRSA63J-332N	RESISTOR
	R94	NRSA63J-152N	RESISTOR
	R95	NRSA63J-332N	RESISTOR
	R96	NRSA63J-333N	RESISTOR
	R97	NRSA63J-123N	RESISTOR
	R99	NRSA63J-333N	RESISTOR
	R100	NRSA63J-223N	RESISTOR
	R101	NRSA63J-561N	RESISTOR
	R103	NRSA63J-103N	RESISTOR
	R104	NRSA63J-103N	RESISTOR
	R110	QRD161J-103	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R151	NVP1301-222N	V RESISTOR, REC FM LEVEL
	R152	NVP1301-681N	V RESISTOR, PB RF EQ
	R153	NVP1301-331N	V RESISTOR, REC COLOR LEVEL
	R154	NVP1301-102N	V RESISTOR, PB BURST LEVEL
	R155	NVP1301-103N	V RESISTOR, DEVIATION
	R156	NVP1301-473N	V RESISTOR, CARRIER
	R157	NVP1301-104N	V RESISTOR, WHITE CLIP LEVEL
	R158	NVP1301-104N	V RESISTOR, DARK CLIP LEVEL
	R159	NVP1301-473N	V RESISTOR, PB Y LEVEL
	R161	NVP1301-103N	V RESISTOR, EE Y LEVEL
	R162	NVP1301-102N	V RESISTOR, 1H DL DEMOD LEVEL
	R163	NVP1301-102N	V RESISTOR, PB ACC INPUT LEVEL
	R164	NVP1301-103N	V RESISTOR, EE BURST LEVEL
	B1	NRSA63J-0R0A	RESISTOR
	B2	NRSA63J-0R0A	RESISTOR
	B3	NRSA63J-0R0A	RESISTOR
	C1	NCB31EK-103A	CAPACITOR
	C2	NCS31HJ-470A	CAPACITOR
	C3	NCS31HJ-220A	CAPACITOR
	C4	NCB31EK-103A	CAPACITOR
	C5	NCS31HJ-330A	CAPACITOR
	C6	NCS31HJ-221A	CAPACITOR
	C7	NCS31HJ-121A	CAPACITOR
	C8	QCYA1EK-223	CAPACITOR
	C9	QER61CM-476GZ	E CAPACITOR
	C12	NCB31EK-103A	CAPACITOR
	C13	NCS31HJ-151A	CAPACITOR
	C14	NCS31HJ-330A	CAPACITOR
	C15	NCB31EK-103A	CAPACITOR
	C16	NCS31HJ-101A	CAPACITOR
	C17	NCS31HJ-560A	CAPACITOR
	C18	NCS31HJ-181A	CAPACITOR
	C19	NCS31HJ-220A	CAPACITOR
	C20	NCS31HJ-120A	CAPACITOR
	C21	QCYA1EK-223	CAPACITOR
	C22	QER61CM-476GZ	E CAPACITOR
	C25	NCB31EK-103A	CAPACITOR
	C26	NCB31EK-103A	CAPACITOR
	C27	NCS31HJ-470A	CAPACITOR
	C28	NCS31HJ-330A	CAPACITOR
	C29	NCS31HJ-470A	CAPACITOR
	C31	QCSA1HJ-391	CAPACITOR
	C32	NCB31EK-103A	CAPACITOR
	C33	NCB31EK-103A	CAPACITOR
	C34	NCB31EK-103A	CAPACITOR
	C36	NCS31HJ-101A	CAPACITOR
	C37	NCS31HJ-221A	CAPACITOR
	C38	NCB31EK-103A	CAPACITOR
	C39	QER61HM-224GZ	E CAPACITOR
	C40	NCB31EK-103A	CAPACITOR
	C41	QCYA1HK-332	CAPACITOR
	C42	QCYA1EK-223	CAPACITOR
	C43	QCYA1EK-223	CAPACITOR
	C44	QEE81AM-476	E CAPACITOR
	C45	QER61HM-105GZ	E CAPACITOR
	C46	QER61EM-335GZ	E CAPACITOR
	C47	QER61CM-475GZ	E CAPACITOR
	C48	QER61EM-335GZ	E CAPACITOR
	C49	QER61CM-106GZ	E CAPACITOR
	C50	QER61CM-106GZ	E CAPACITOR
	C51	QER61CM-106GZ	E CAPACITOR
	C54	QCYA1EK-223	CAPACITOR
	C55	QCYA1EK-223	CAPACITOR
	C56	QER61HM-105GZ	E CAPACITOR
	C57	QER61CM-475GZ	E CAPACITOR
	C58	QEE41CM-476	TANTAL CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	OR	QEE81CM-476	T.CAP
	OR	QEJ41CM-476	T.CAP
	C59	QER61CM-476GZ	E CAPACITOR
	C60	NCB31EK-103A	CAPACITOR
	C61	NCB31EK-103A	CAPACITOR
	C65	NCB31EK-103A	CAPACITOR
	C66	NCR21CK-473A	CAPACITOR
	C67	NCB31EK-103A	CAPACITOR
	C68	NCS31HJ-101A	CAPACITOR
	C69	QCYA1HK-333	CAPACITOR
	C70	QCYA1HK-333	CAPACITOR
	C71	QCYA1HK-153	CAPACITOR
	C72	NCS31HJ-820A	CAPACITOR
	C73	NCS31HJ-100A	CAPACITOR
	C74	NCS31HJ-820A	CAPACITOR
	C75	NCB31HK-272A	CAPACITOR
	C76	NCS31HJ-151A	CAPACITOR
	C77	NCS31HJ-150A	CAPACITOR
	C78	NCS31HJ-151A	CAPACITOR
	C79	QCYA1EK-223	CAPACITOR
	C80	NCR21CK-473A	CAPACITOR
	C81	NCS31HJ-6R0A	CAPACITOR
	C82	NCS31HJ-101A	CAPACITOR
	C83	NCS31HJ-121A	CAPACITOR
	C85	NCB31EK-103A	CAPACITOR
	C86	NCS31HJ-101A	CAPACITOR
	C87	NCS31HJ-221A	CAPACITOR
	C88	NCS31HJ-3R0A	CAPACITOR
	C89	QCYA1EK-223	CAPACITOR
	C90	NCS31HJ-101A	CAPACITOR
	C92	NCS31HJ-220A	CAPACITOR
	C93	QER61HM-105GZ	E CAPACITOR
	C94	QER61HM-105GZ	E CAPACITOR
	C95	QER61HM-105GZ	E CAPACITOR
	C96	QER61HM-105GZ	E CAPACITOR
	C97	QEE81AM-476	T.CAP
	C100	QCFA1EZ-104	CAPACITOR
	C101	QEK61AM-107	E CAPACITOR
	C102	QER61CM-106GZ	E CAPACITOR
	C104	QEKC0HM-477	E CAPACITOR
	C105	NCB31EK-103A	CAPACITOR
	C111	QCYA1HK-153	CAPACITOR
	L1	PU59152-121J	COIL
	L2	PU59152-390J	COIL
	L3	PU59152-220J	COIL
	L4	YU40589-271KY	COIL
	L5	PU59152-680J	COIL
	L6	YU40589-470JY	COIL
	L8	PU59152-680J	COIL
	L9	PU59152-560J	COIL
	L10	PU59152-100J	COIL
	L11	PU59152-180J	COIL
	L12	YU40589-331KY	COIL
	L13	YU40589-470JY	COIL
	L14	PU59152-220J	COIL
	L16	PU59152-100J	COIL
	L17	PU59152-560J	COIL
	L18	PU59152-121J	COIL
	L19	YU40589-470JY	COIL
	L21	YU40589-470JY	COIL
	L22	YU40589-470JY	COIL
	L25	YU40589-102KY	COIL
	L26	YU40589-331KY	COIL
	L27	YU40941-682	COIL
	L28	YU40589-271KY	COIL

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	L29	PU59152-470J	COIL
	L30	PU59152-181J	COIL
	L32	PU59152-390J	CDIL
	L33	PU59152-2R2J	COIL
	L34	YU40589-470JY	COIL
	L35	PU59152-470J	COIL
	L37	YU40589-470JY	COIL
	L41	YU40589-331KY	COIL
	EQ1	YU40582	EQUALIZER
	LPF1	YU40583	LOW PASS FILTER
	LPF2	YU40906	LOW PASS FILTER
	OR	YU40584	CCD OUT L.P.F
	BPF1	YU40585	BAND PASS FILTER
	BPF2	YU40586	BAND PASS FILTER
	DL1	YU40243-2	COMB FILTER
⚠	X1	YU40644	CRYSTAL RESONATOR
	TP1	YU40581-AY	CHIP TP(2125)
	TP2	YU40581-AY	CHIP TP(2125)
	TP3	YU40581-AY	CHIP TP(2125)
	TP4	YU40581-AY	CHIP TP(2125)
	TP6	YU40581-AY	CHIP TP(2125)
	TP7	YU40581-AY	CHIP TP(2125)
	TP8	YU40581-AY	CHIP TP(2125)
	TP9	PU56278	TEST PIN
	TP10	YU40581-AY	CHIP TP(2125)
	TP11	PU56278	TEST PIN
	TP12	PU56278	TEST PIN
	TP13	YU40581-AY	CHIP TP(2125)
	CN1	YU40105-14	CAP HOUSING
	CN2	YU40684-10	CAP HOUSING
	CN3	YU40105-8	CAP HOUSING
	CN4	YU40105-10	CAP HOUSING

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8. DRUM MDA BOARD ASSEMBLY <03>

	PWBA	YB20103B	DRUM MDA BOARD ASSY
	IC1	BA6452F	IC
	D1	MA141WK	DIODE
	R1	QRSA08J-102YN	RESISTOR
	R2	QRSA08J-104YN	RESISTOR
	R3	QRSA08J-153YN	RESISTOR
	R4	QRSA08J-222YN	RESISTOR
	R5	QRSA08J-121YN	RESISTOR
	R6	QRSA08K-2R2YN	RESISTOR
	R7	QRSA08K-2R2YN	RESISTOR
	R8	QRSA08K-2R2YN	RESISTOR
	R9	QRSA08J-104YN	RESISTOR
	R10	QRSA08J-0R0Y	RESISTOR
	R11	QRG12BJ-R68AR	MF RESISTOR
	C1	QCY81EK-104	CAPACITOR
	C2	QCYA1HK-471	CAPACITOR
	C3	QCY81CK-224	CAPACITOR
	C4	QCFA1EZ-104	CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	C5	QCYA1EK-223	CAPACITOR
	C6	QERF1CM-106	E CAPACITOR
	C7	QERF1CM-106	E CAPACITOR
	C8	QERF1CM-106	E CAPACITOR
	C9	QCFA1EZ-104	CAPACITOR
	C10	QERF1CM-106	E CAPACITOR
	C11	QERF1CM-106	E CAPACITOR
	SW1	YU40177-2	PUSH SWITCH,(S1)
	SLD1	YU41030	SHEET
	CN1	YU40682-16	CAP HOUSING,(BOARD TO BOARD)
	CN2	YU40107-15	CAP HOUSING
	CN3	YU40096-2Y	CAP HOUSING
	CN4	YU40096-2	CAP HOUSING
	CN6	YU40096-2	CAP HOUSING

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9. PRE/REC AMP BOARD ASSEMBLY <04>

	PWBA	BW7684	PRE/REC AMP MODULE
	OR	BW7652A	PRE/REC AMP MODULE

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10. MIC JACK BOARD ASSEMBLY <05>

	PWBA	YB20079A1	MIC JACK BOARD ASSY
	R1	NRD187J-100N	MLF RESISTOR
	J1	PU59711	MIC JACK
	CN1	YU40096-3	CAP HOUSING
	CN2	YU40095-2	CAP HOUSING

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11. JACK BOARD ASSEMBLY <06>

	PWBA	YB20079E2	JACK BOARD ASSY
	D2	RLZ5.6B	ZENER DIODE
	D3	RLZ8.2B	ZENER DIODE
	R1	NRD187J-221N	MLF RESISTOR
	R2	NRD187J-102N	MLF RESISTOR
	R3	NRD187J-221N	MLF RESISTOR
	R4	NRD187J-750N	MLF RESISTOR
	R6	NRD187J-750N	MLF RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	FW1	YU40206-306	FLAT WIRE2
	FW2	YU40206-308	FLAT WIRE1
	J2	YU40273-2	JACK BOX(B)

12. TRIGGER BOARD ASSEMBLY <07>

	PWBA	YB20079A3	TRIGGER BOARD ASSY
	D1	ERA81-004	DIODE
	R1	QRD162J-683	RESISTOR
	SW1	PU59843	TACT SWITCH,S1
	SW2	YU40969	SLIDE SWITCH,S2
	ETH1	YQ40535	EARTH LUG
	SPC1	YQ40478	SPACER
	CN1	YU40096-3	CAP HOUSING
	CN2	YU40096-4	CAP HOUSING
	CN3	YU40096-2	CAP HOUSING
⚠	F1	YU40891-3R15	MICRO FUSE, NOT INCL BOARD ASSY

13. SENSOR BOARD ASSEMBLY <08>

	PWBA	YS40012E	SENSOR BOARD ASSY
	SW1	YU40176	CASSETTE SWITCH
	PS1	YU40186	REEL SENSOR,X2

14. FLY CONNECTOR ASSEMBLY <09>

	PWB1	YB30047	FLY CONN BOARD
	CN1	YU41053-03	CAP HOUSING

15. OSC BOARD ASSEMBLY <10>

	PWBA	YB20142A	OSC BOARD ASSY
	Q1	2SC4081(RS)	TRANSISTOR
	Q2	2SC4081(RS)	TRANSISTOR
	Q3	2SC4081(RS)	TRANSISTOR
	Q4	2SC4081(RS)	TRANSISTOR
	Q5	2SC4081(RS)	TRANSISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R1	QRSA08J-102YN	RESISTOR
	R2	QRSA08J-153YN	RESISTOR
	R3	QRSA08K-5R6YN	RESISTOR
	R4	QRSA08K-5R6YN	RESISTOR
	R5	QRSA08J-393YN	RESISTOR
	R6	QRSA08J-393YN	RESISTOR
	R7	QRSA08K-4R7YN	RESISTOR
	R8	QRSA08K-4R7YN	RESISTOR
	R9	QRSA08J-154YN	RESISTOR
	R10	QRSA08J-154YN	RESISTOR
	C1	QCFA1EZ-473	CAPACITOR
	C2	QCF81CZ-105	CAPACITOR
	C3	QCTA1CH-101	CAPACITOR
	C4	QCTA1CH-181	CAPACITOR
	C5	QCTA1CH-271	CAPACITOR
	C6	QCTA1CH-181	CAPACITOR
	C7	QCYA1HK-103	CAPACITOR
	C8	QCYA1HK-332	CAPACITOR
	C9	QCYA1HK-332	CAPACITOR
	C10	QFZ9011-563	MM CAPACITOR
	L1	YU40248-470KY	COIL
	L2	PU58201-1R2K	COIL
⚠	L3	PU56175	S.TRANS
⚠	L4	YU41052	F.E. OSC COIL
	HD1	YQ41362	HOLDER BOARD
	SCW1	SPSH1720M	MINI SCREW
	SLD1	YQ30375	SHIELD COVER
	SLD2	YU41142	SHIELD PLATE
	CN1	YU40096-3	CAP HOUSING
	CN2	YU40096-5	CAP HOUSING
	CN3	YU40096-2	CAP HOUSING

16. VIDEO-1 BOARD ASSEMBLY <21>

	PWBA	YB20200B-01-C	VIDEO-1 BOARD ASSY
	IC2	UPD9319CGC	IC
	IC3	UPD16501GS	IC
	IC4	UPD6148GS	IC
	IC5	H8D7091B	IC
	IC6	UPC2373GH	IC
	IC7	UPC2371GH	IC
	IC8	MSM6830	IC
	OR	MSM6830-XE	IC
	Q1	2SD1819(RS)	TRANSISTOR
	Q2	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR
	Q5	2SD1819(RS)	TRANSISTOR
	Q6	2SC4181	TRANSISTOR
	Q7	2SC3936(BC)	TRANSISTOR
	Q9	2SC4181	TRANSISTOR
	Q12	2SC4181	TRANSISTOR
	Q19	2SC4181	TRANSISTOR
	Q20	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	Q21	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR
	Q22	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	Q23	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q24	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q25	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q26	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q28	2SC3936(BC)	TRANSISTOR
		OR 2SC4098(PQ)	TRANSISTOR
	Q29	2SC3931(CD)	TRANSISTOR
	Q30	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q31	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q32	2SC3936(BC)	TRANSISTOR
		OR 2SC4098(PQ)	TRANSISTOR
	Q33	2SA1532(BC)	TRANSISTOR
		OR 2SA1576(QR)	TRANSISTOR
	Q34	2SC3936(BC)	TRANSISTOR
		OR 2SC4098(PQ)	TRANSISTOR
	Q35	2SC3936(BC)	TRANSISTOR
		OR 2SC4098(PQ)	TRANSISTOR
	Q36	2SC3936(BC)	TRANSISTOR
		OR 2SC4098(PQ)	TRANSISTOR
	D1	MA143	DIODE
	D2	MA141WA	DIODE
	D3	MA141WK	DIODE
	D4	MA143	DIODE
	D5	MA141WK	DIODE
	R1	NRSA63J-105N	RESISTOR
	R2	NRSA63J-102N	RESISTOR
	R3	QRSA08J-122YN	RESISTOR
	R4	NVP1301-222N	V RESISTOR,CDS TIMING
	R5	NRSA63J-561N	RESISTOR
	R6	NRSA63J-272N	RESISTOR
	R7	NRSA63J-270N	RESISTOR
	R8	NRSA63J-270N	RESISTOR
	R9	NRSA63J-121N	RESISTOR
	R10	NRSA63J-512N	RESISTOR
	R11	NRSA63J-203N	RESISTOR
	R12	NRSA63J-102N	RESISTOR
	R15	NRSA63J-272N	RESISTOR
	R16	NVP1301-104N	V RESISTOR,BLOOMING
	R17	NRSA63J-183N	RESISTOR
	R18	NRSA63J-184N	RESISTOR
	R21	NRSA63J-472N	RESISTOR
	R22	NRSA63J-473N	RESISTOR
	R23	NVP1301-473N	V RESISTOR,RESET BIAS
	R24	NRSA63J-332N	RESISTOR
	R25	NRSA63J-220N	RESISTOR
	R26	NRSA63J-104N	RESISTOR
	R27	NRSA63J-562N	RESISTOR
	R28	NRSA63J-100N	RESISTOR
	R29	NRSA63J-221N	RESISTOR
	R30	NRSA63J-222N	RESISTOR
	R31	NRSA63J-392N	RESISTOR
	R32	NRSA63J-102N	RESISTOR
	R33	NRSA63J-0R0A	RESISTOR
	R35	NRSA63J-221N	RESISTOR
	R36	NRSA63J-681N	RESISTOR
	R37	NRSA63J-681N	RESISTOR
	R38	NRSA63J-560N	RESISTOR
	R39	NRSA63J-560N	RESISTOR
	R43	QRSA08J-0R0Y	RESISTOR
	R49	NRSA63J-221N	RESISTOR
	R50	NRSA63J-102N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R51	NRSA63J-102N	RESISTOR
	R52	NRSA63J-102N	RESISTOR
	R53	NRSA63J-332N	RESISTOR
	R54	NVP1301-223N	V RESISTOR,AGC
	R55	NRSA63J-473N	RESISTOR
	R56	NRSA63J-103N	RESISTOR
	R57	NRSA63J-303N	RESISTOR
	R58	NRSA63J-123N	RESISTOR
	R59	NRSA63J-473N	RESISTOR
	R60	NRSA63J-563N	RESISTOR
	R61	NRSA63J-102N	RESISTOR
	R62	NVP1301-103N	V RESISTOR, BLUE SEP
	R63	NVP1301-103N	V RESISTOR, RED SEP
	R64	NRSA63J-102N	RESISTOR
	R65	NVP1301-103N	V RESISTOR, R LEVEL
	R66	NVP1301-103N	V RESISTOR, B LEVEL
	R67	NRSA63J-332N	RESISTOR
	R68	NRSA63J-562N	RESISTOR
	R69	NRSA63J-102N	RESISTOR
	R70	NRSA63G-103N	RESISTOR
	R71	NRSA63G-103N	RESISTOR
	R72	NRSA63J-682N	RESISTOR
	R73	NRSA63J-103N	RESISTOR
	R74	NRSA63J-102N	RESISTOR
	R75	NVP1301-103N	V RESISTOR,R SETUP
	R76	NVP1301-103N	V RESISTOR,B SETUP
	R77	NRSA63J-102N	RESISTOR
	R78	NRSA63G-273N	RESISTOR
	R79	NRSA63G-393N	RESISTOR
	R80	NRSA63J-183N	RESISTOR
	R81	NRSA63J-243N	RESISTOR
	R82	NRSA63J-821N	RESISTOR
	R83	NRSA63J-122N	RESISTOR
	R84	NRSA63J-332N	RESISTOR
	R85	NRSA63J-102N	RESISTOR
	R86	NRSA63J-102N	RESISTOR
	R87	NRSA63J-102N	RESISTOR
	R88	NRSA63J-102N	RESISTOR
	R89	NRSA63J-562N	RESISTOR
	R94	NRSA63J-102N	RESISTOR
	R95	NRSA63J-102N	RESISTOR
	R96	NRSA63J-102N	RESISTOR
	R97	NRSA63J-562N	RESISTOR
	R98	NRSA63J-222N	RESISTOR
	R99	NRSA63J-124N	RESISTOR
	R100	NRSA63J-681N	RESISTOR
	R101	NRSA63J-331N	RESISTOR
	R102	NRSA63J-331N	RESISTOR
	R103	NRSA63J-182N	RESISTOR
	R104	NRSA63J-391N	RESISTOR
	R105	NRSA63J-102N	RESISTOR
	R106	NRSA63J-271N	RESISTOR
	R107	NRSA63J-751N	RESISTOR
	R108	NRSA63J-222N	RESISTOR
	R109	NRSA63J-122N	RESISTOR
	R110	NRSA63J-472N	RESISTOR
	R111	NRSA63J-102N	RESISTOR
	R112	NRSA63J-102N	RESISTOR
	R113	NVP1301-222N	V RESISTOR,1H DELAYED SIG.LEV.
	R114	NRSA63J-153N	RESISTOR
	R115	NRSA63J-0R0A	RESISTOR
	R116	NRSA63J-0R0A	RESISTOR
	R120	NRSA63J-222N	RESISTOR
	R121	NRSA63J-332N	RESISTOR
	R122	NRSA63J-822N	RESISTOR
	R123	NRSA63J-222N	RESISTOR
	R124	NRSA63J-102N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R125	NVP1301-103N	V RESISTOR, B-Y LEVEL
	R126	NRSA63J-821N	RESISTOR
	R127	NRSA63J-122N	RESISTOR
	R128	NRSA63J-105N	RESISTOR
	R130	NRSA63J-333N	RESISTOR
	R131	NRSA63J-104N	RESISTOR
	R132	NRSA63J-183N	RESISTOR
	R133	NRSA63J-333N	RESISTOR
	R134	NRSA63J-102N	RESISTOR
	R135	NVP1301-103N	V RESISTOR, Y LEVEL
	R136	NRSA63J-102N	RESISTOR
	R137	NRSA63J-102N	RESISTOR
	R138	NRSA63J-102N	RESISTOR
	R139	NRSA63J-102N	RESISTOR
	R140	NRSA63J-102N	RESISTOR
	R141	NRSA63J-333N	RESISTOR
	R142	NRSA63J-303N	RESISTOR
	R143	NRSA63J-333N	RESISTOR
	R144	NRSA63J-303N	RESISTOR
	R145	NRSA63J-102N	RESISTOR
	R146	NRSA63J-103N	RESISTOR
	R147	NRSA63J-103N	RESISTOR
	R148	NRSA63J-123N	RESISTOR
	R149	NVP1301-223N	V RESISTOR, COLOR D. OFFSET
	R151	NRSA63J-333N	RESISTOR
	R152	NRSA63J-104N	RESISTOR
	R154	NVP1301-103N	V RESISTOR, COLOR D. BALANCE
	R155	NRSA63J-102N	RESISTOR
	R156	NRSA63J-393N	RESISTOR
	R157	NRSA63J-393N	RESISTOR
	R159	NRSA63J-103N	RESISTOR
	R160	NRSA63J-103N	RESISTOR
	R161	NRSA63J-0R0A	RESISTOR
	R162	NRSA63J-471N	RESISTOR
	R164	NRSA63J-0R0A	RESISTOR
	R165	NRSA63J-471N	RESISTOR
	R168	NRSA63J-102N	RESISTOR
	R169	NRSA63J-102N	RESISTOR
	R170	NRSA63J-562N	RESISTOR
	R171	NRSA63J-272N	RESISTOR
	R172	NRSA63J-100N	RESISTOR
	R173	NRSA63J-103N	RESISTOR
	R174	NRSA63J-105N	RESISTOR
	C2	NCT07CH-100A	CAPACITOR
	C3	PU59867-100W	CHIP TM CAPACITOR,OSC FREQ.
	C8	NCB31EK-103A	CAPACITOR
	C9	NEH10JM-107NP	E CAPACITOR
	OR	NEH30JM-107NP	CAPACITOR
	C10	NCF31CZ-104A	CAPACITOR
	C11	NEH10JM-107NP	E CAPACITOR
	OR	NEH30JM-107NP	CAPACITOR
	C12	NCF31CZ-104A	CAPACITOR
	C14	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C15	NCF31CZ-104A	CAPACITOR
	C16	NEH11CM-476NP	E CAPACITOR
	OR	NEH31CM-476NP	CAPACITOR
	C18	NCF31CZ-104A	CAPACITOR
	C19	NEH10JM-107NP	E CAPACITOR
	OR	NEH30JM-107NP	CAPACITOR
	C20	NEH11CM-476NP	E CAPACITOR
	OR	NEH31CM-476NP	CAPACITOR
	C23	NCF31CZ-104A	CAPACITOR
	C24	NCB31EK-103A	CAPACITOR
	C26	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	C27	NCB31EK-103A	CAPACITOR
	C28	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C30	NCB31EK-103A	CAPACITOR
	C31	NCB31EK-103A	CAPACITOR
	C32	NEH11CM-106NZ	E CAPACITOR
	OR	NEH31CM-106NZ	E CAPACITOR
	C33	QCF81CZ-105	CAPACITOR
	OR	PU59758-105	CAPACITOR
	C34	QEF81AM-106	TANTAL CAPACITOR
	C35	QEF81AM-475	TANTAL CAPACITOR
	C36	NCF31CZ-104A	CAPACITOR
	C37	NCT07CH-221A	CAPACITOR
	C38	QEF80GM-106	TANTAL CAPACITOR
	C39	NCT07CH-330A	CAPACITOR
	C40	NCT07CH-470A	CAPACITOR
	C41	NCT07CH-470A	CAPACITOR
	C42	QCY81EK-104	CAPACITOR
	C45	NCF31CZ-104A	CAPACITOR
	C47	NCF31CZ-104A	CAPACITOR
	C48	NCF31CZ-104A	CAPACITOR
	C49	NCF31CZ-104A	CAPACITOR
	C50	NEH10JM-226NZ	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C52	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C53	NCF31CZ-104A	CAPACITOR
	C54	NEH10JM-226NZ	E CAPACITOR
	OR	NEH30JM-226NZ	E CAPACITOR
	C55	NEH10JM-226NZ	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C56	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C57	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C58	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C59	QCYA1EK-104	CAPACITOR
	C60	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C61	QCYA1EK-104	CAPACITOR
	C62	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C63	QCYA1EK-104	CAPACITOR
	C64	PU59913-473	CAPACITOR
	C65	PU59913-473	CAPACITOR
	C66	QCYA1EK-104	CAPACITOR
	C67	QCYA1EK-104	CAPACITOR
	C68	QCYA1EK-104	CAPACITOR
	C69	QCYA1EK-104	CAPACITOR
	C70	QCYA1EK-104	CAPACITOR
	C71	QCYA1EK-104	CAPACITOR
	C73	NEH10JM-107NP	E CAPACITOR
	OR	NEH30JM-107NP	CAPACITOR
	C74	NCF31CZ-104A	CAPACITOR
	C80	QEF81AM-106	TANTAL CAPACITOR
	C81	QEF81CM-475	TANTAL CAPACITOR
	C82	QEF81VM-334	TANTAL CAPACITOR
	C83	QEF81VM-334	TANTAL CAPACITOR
	C84	NCF31CZ-104A	CAPACITOR
	C85	NCB31EK-103A	CAPACITOR
	C86	QEF81AM-475	TANTAL CAPACITOR
	C87	NCF31CZ-104A	CAPACITOR
	C88	NCB31EK-103A	CAPACITOR
	C89	QEF81AM-475	TANTAL CAPACITOR
	C90	QEF81AM-475	TANTAL CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	C91	NCF31CZ-104A	CAPACITOR
	C92	NCF31CZ-104A	CAPACITOR
	C93	NEH11CM-476NP	E CAPACITOR
	OR	NEH31CM-476NP	CAPACITOR
	C94	NCB31EK-103A	CAPACITOR
	C95	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C96	NCF31CZ-104A	CAPACITOR
	C97	NCF31CZ-104A	CAPACITOR
	C99	NCF31CZ-104A	CAPACITOR
	C100	NEH10JM-226NZ	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C102	QCYA1EK-104	CAPACITOR
	C103	NCF31CZ-104A	CAPACITOR
	C104	PU59913-473	CAPACITOR
	C105	NCT07CH-470A	CAPACITOR
	C106	NCB31EK-103A	CAPACITOR
	C107	QEF80GM-106	TANTAL CAPACITOR
	C108	NCF31CZ-104A	CAPACITOR
	C109	PU59913-473	CAPACITOR
	C110	QCYA1EK-104	CAPACITOR
	C111	QCYA1EK-104	CAPACITOR
	C112	QCYA1EK-104	CAPACITOR
	C113	QCYA1EK-104	CAPACITOR
	C114	QCYA1EK-104	CAPACITOR
	C115	NCF31CZ-104A	CAPACITOR
	C116	QEF81AM-225	TANTAL CAPACITOR
	C117	NCF31CZ-104A	CAPACITOR
	C118	NCF31CZ-104A	CAPACITOR
	C119	NEH11CM-106NZ	E CAPACITOR
	OR	NEH31CM-106NZ	E CAPACITOR
	L101	YU40248-470KY	COIL
	OR	YU40740-470KY	COIL
	L102	YU40248-220KY	COIL
	OR	YU40740-220KY	COIL
	L103	YU40248-470KY	COIL
	OR	YU40740-470KY	COIL
	L104	YU40248-470KY	COIL
	OR	YU40740-470KY	COIL
	L105	YU40248-220KY	COIL
	OR	YU40740-220KY	COIL
	EQ102	YU40082-2	EQUALIZER
	EQ103	YU40082-2	EQUALIZER
	LPF103	YU40075-2	LOW PASS FILTER
	OR	YU40777	LOW PASS FILTER
	OR	YU40777-R	LOW PASS FILTER
	LPF104	YU40076-3	LOW PASS FILTER
	OR	YU40501	LOW PASS FILTER
	OR	YU40501-P	LOW PASS FILTER
	LPF105	YU40077-2	LOW PASS FILTER
	OR	YU40778	LOW PASS FILTER
	OR	YU40778-R	LOW PASS FILTER
	LPF106	YU40076-3	LOW PASS FILTER
	OR	YU40501	LOW PASS FILTER
	OR	YU40501-P	LOW PASS FILTER
	DL101	YU40128-2	DELAY LINE
⚠	X101	YU40178B	CRYSTAL RESONATOR
	TRAP101	YU40639	CHIP TRAP
	OR	YU40639-Z	CHIP TRAP
	TP101	YU40581-AY	CHIP TP(2125)
	TP102	YU40581-AY	CHIP TP(2125)
	TP103	YU40581-AY	CHIP TP(2125)
	TP104	YU40581-AY	CHIP TP(2125)
	TP105	YU40581-AY	CHIP TP(2125)
	TP106	YU40581-AY	CHIP TP(2125)

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	TP107	YU40581-AY	CHIP TP(2125)
	TP108	YU40581-AY	CHIP TP(2125)
	CN101	PU58655-3	CAP HOUSING
	CN102	PU58654-10	CAP HOUSING
	CN103	YU40101-10	CAP HOUSING,(BOARD TO BOARD)
	CN104	YU40101-8	CAP HOUSING,(BOARD TO BOARD)
	CN105	YU40103-8	CAP HOUSING,(BOARD TO BOARD)
	CN106	YU40101-10	CAP HOUSING,(BOARD TO BOARD)
	CN107	YU40101-8	CAP HOUSING,(BOARD TO BOARD)
⚠	CP101	ICP-F20	CIRCUIT PROTECTOR
⚠	CP102	ICP-F10	CIRCUIT PROTECTOR

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* 17. VIDEO-2 BOARD ASSEMBLY <22> *
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	PWBA	YB20073A-03-C	VIDEO-2 BOARD ASSY
	IC201	MSM6984MS	IC
	OR	MSM6984MS-XK	IC
	IC202	MSM6984MS	IC
	OR	MSM6984MS-XK	IC
	Q201	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	Q202	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR
	Q203	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	Q204	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR
	R201	QRSA08J-0R0Y	RESISTOR
	R203	QRSA08J-152YN	RESISTOR
	R204	QRSA08J-102YN	RESISTOR
	R205	QRSA08J-102YN	RESISTOR
	R206	QRSA08J-222YN	RESISTOR
	R207	QRSA08J-472YN	RESISTOR
	R208	QRSA08J-682YN	RESISTOR
	R209	QRSA08J-152YN	RESISTOR
	R210	QRSA08J-102YN	RESISTOR
	R211	QRSA08J-102YN	RESISTOR
	R212	QRSA08J-222YN	RESISTOR
	C201	QEF81CM-685	TANTAL CAPACITOR
	C202	QEF81AM-475	TANTAL CAPACITOR
	C203	QCYA1HJ-103	CAPACITOR
	C204	QCYA1HJ-103	CAPACITOR
	C205	QCYA1HJ-103	CAPACITOR
	C206	QCYA1HJ-103	CAPACITOR
	C207	QCFA1EZ-104	CAPACITOR
	C208	QEF81AM-475	TANTAL CAPACITOR
	C209	QCYA1HJ-103	CAPACITOR
	C210	QCYA1HJ-103	CAPACITOR
	C211	QCYA1HJ-103	CAPACITOR
	C212	QCYA1HJ-103	CAPACITOR
	C213	QCFA1EZ-104	CAPACITOR
	C214	QEF81AM-475	TANTAL CAPACITOR
	L201	YU40248-220KY	COIL
	L202	YU40248-220KY	COIL
	LPF201	YU40254	LOW PASS FILTER
	LPF202	YU40254	LOW PASS FILTER
	CN201	YU40105-8	CAP HOUSING,(BOARD TO BOARD)

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
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			**********
			* 18. ENCODER BORAD ASSEMBLY <23> *
			**********
	PWBA	YB20074B-03-C	ENCODER BOARD ASSY
	IC301	AN2276S	IC
	OR	AN2276S-X2	IC
	IC302	BA7606F	IC
	IC303	MC8180B	IC
	IC304	TC4S71F	IC
	IC305	NJM4560M	IC
	OR	BA4560F	IC
	OR	RC4560M	IC
	IC306	NJM4560M	IC
	OR	RC4560M	IC
	OR	BA4560F	IC
	Q301	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	Q302	2SC3936(C)	TRANSISTOR
	OR	2SC4098(Q)	TRANSISTOR
	OR	2SC4177(6)	TRANSISTOR
	Q303	2SC3936(C)	TRANSISTOR
	OR	2SC4177(6)	TRANSISTOR
	OR	2SC4098(Q)	TRANSISTOR
	Q304	2SA1532(BC)	TRANSISTOR
	OR	2SA1576(QR)	TRANSISTOR
	Q305	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	Q306	2SC3936(BC)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	Q307	2SC3936(BC)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	Q308	2SC3936(BC)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	Q309	2SC3936(BC)	TRANSISTOR
	OR	2SC4177(56)	TRANSISTOR
	OR	2SC4098(PQ)	TRANSISTOR
	D301	RD7.5M-T1B2	ZENER DIODE
	D302	MA141WA	DIODE
	R301	NRSA63J-103N	RESISTOR
	R302	NRSA63J-102N	RESISTOR
	R303	NRSA63J-103N	RESISTOR
	R304	NRSA63J-152N	RESISTOR
	R305	NRSA63J-222N	RESISTOR
	R306	NRSA63J-471N	RESISTOR
	R307	NRSA63J-123N	RESISTOR
	R308	NRSA63J-392N	RESISTOR
	R309	NRSA63J-123N	RESISTOR
	R310	NRSA63J-103N	RESISTOR
	R311	NRSA63G-224N	RESISTOR
	R312	NRSA63G-223N	RESISTOR
	R313	NRSA63G-473N	RESISTOR
	R314	NRSA63J-122N	RESISTOR
	R315	NRSA63J-682N	RESISTOR
	R316	NRSA63G-223N	RESISTOR
	R317	NRSA63G-683N	RESISTOR
	R318	NRSA63J-123N	RESISTOR
	R319	NRSA63J-103N	RESISTOR
	R320	NRSA63J-103N	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R321	NRSA63J-562N	RESISTOR
	R322	NRSA63G-223N	RESISTOR
	R323	NRSA63J-123N	RESISTOR
	R324	NRSA63J-562N	RESISTOR
	R325	NRSA63G-224N	RESISTOR
	R326	NRSA63J-222N	RESISTOR
	R327	NVP1301-223N	V RESISTOR,WHITE CLIP LEVEL
	R328	NRSA63J-222N	RESISTOR
	R329	NRSA63J-102N	RESISTOR
	R330	NVP1301-103N	V RESISTOR,SYNC LEVEL
	R331	NRSA63J-123N	RESISTOR
	R332	NRSA63J-123N	RESISTOR
	R333	NRSA63J-272N	RESISTOR
	R334	NRSA63J-103N	RESISTOR
	R335	NRSA63J-682N	RESISTOR
	R336	NRSA63J-103N	RESISTOR
	R337	NRSA63J-102N	RESISTOR
	R338	NRSA63J-102N	RESISTOR
	R339	NRSA63J-103N	RESISTOR
	R340	NRSA63J-100N	RESISTOR
	R341	NRSA63J-223N	RESISTOR
	R342	NRSA63J-223N	RESISTOR
	R343	NRSA63J-223N	RESISTOR
	R344	NVP1301-223N	V RESISTOR, R ENCODER BALANCE
	R345	NVP1301-223N	V RESISTOR, B ENCODER BALANCE
	R346	NRSA63J-102N	RESISTOR
	R347	NRSA63J-272N	RESISTOR
	R348	NRSA63J-102N	RESISTOR
	R349	NRSA63J-102N	RESISTOR
	R350	NRSA63J-100N	RESISTOR
	R351	NRSA63J-102N	RESISTOR
	R352	NRSA63J-223N	RESISTOR
	R353	NVP1301-103N	V RESISTOR,BURST LEVEL
	R354	NRSA63J-223N	RESISTOR
	R355	NRSA63J-102N	RESISTOR
	R356	NVP1301-103N	V RESISTOR,COLOR GAIN
	R357	NRSA63J-102N	RESISTOR
	R358	NRSA63J-272N	RESISTOR
	R359	NRSA63J-222N	RESISTOR
	R360	NRSA63J-682N	RESISTOR
	R361	NRSA63J-681N	RESISTOR
	R362	NRSA63J-682N	RESISTOR
	R363	NRSA63J-681N	RESISTOR
	R364	NVP1301-222N	V RESISTOR,BURST PHASE
	R365	NRSA63J-562N	RESISTOR
	R370	NRSA63J-394N	RESISTOR
	R374	NRSA63J-103N	RESISTOR
	C301	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C302	NCR21CM-473A	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	C303	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C304	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C305	NCR21CM-473A	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	C306	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C307	NEH11CM-106NZ	E CAPACITOR
	C308	NEH11CM-106NZ	E CAPACITOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	C309	QEF81EM-155	TANTAL CAPACITOR
	C310	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C311	NCR21CM-473A	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	C312	NCR21CM-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	C313	NCR21CM-473A	CAPACITOR
	OR	NCR21CK-473A	CAPACITOR
	OR	PU59913-473	CAPACITOR
	C314	NCB31EK-103A	CAPACITOR
	C315	NCB31EK-103A	CAPACITOR
	C316	NCB31EK-103A	CAPACITOR
	C317	NCB31EK-103A	CAPACITOR
	C318	QEF80GM-226	TANTAL CAPACITOR
	C319	NCT07CH-560A	CAPACITOR
	C320	NCT07CH-101A	CAPACITOR
	C321	NCT07CH-101A	CAPACITOR
	C322	NCB31EK-103A	CAPACITOR
	C323	NCB31EK-103A	CAPACITOR
	C324	NCB31EK-103A	CAPACITOR
	C325	NEH10JM-226NZ	E CAPACITOR
	C326	NCB31EK-103A	CAPACITOR
	C327	NCB31EK-103A	CAPACITOR
	C328	QEJ41CM-476	TANTAL CAPACITOR
	C329	NCB31EK-103A	CAPACITOR
	C330	NEH10JM-226NZ	E CAPACITOR
	C331	NEH10JM-226NZ	E CAPACITOR
	C332	NCB31EK-103A	CAPACITOR
	C333	NEH10JM-226NZ	E CAPACITOR
	C334	NCB31EK-103A	CAPACITOR
	C335	NCS31HJ-331A	CAPACITOR
	L301	YU40248-220KY	COIL
	L302	YU40248-220KY	COIL
	EQ301	YU40637	EQUALIZER
	OR	YU40720	EQUALIZER
	OR	YU40720-P	EQUALIZER
	BPF301	YU40640	BAND PASS FILTER
	OR	YU40756	BAND PASS FILTER
	OR	YU40756-P	BAND PASS FILTER
	TP303	YU40648	TEST PIN
	TP304	YU40648	TEST PIN
	CN301	YU40105-10	CAP HOUSING,(BOARD TO BOARD)
	CN302	YU40096-8	CAP HOUSING
	CN303	YU40096-2Y	CAP HOUSING
	CN304	YU40096-4Y	CAP HOUSING
	CN305	YU40105-8	CAP HOUSING,(BOARD TO BOARD)

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#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R463	NRSA63J-333N	RESISTOR
	R464	NRSA63J-682N	RESISTOR
	R465	NRSA63J-104N	RESISTOR
	R466	NRSA63J-104N	RESISTOR
	R467	NRSA63J-104N	RESISTOR
	R468	NRSA63J-104N	RESISTOR
	R469	NRSA63J-103N	RESISTOR
	R470	NRSA63J-102N	RESISTOR
	R471	NRSA63J-104N	RESISTOR
	R474	NRSA63J-222N	RESISTOR
	R475	NRSA63J-222N	RESISTOR
	R476	NRSA63J-102N	RESISTOR
	R478	NRSA63J-104N	RESISTOR
	R479	NRSA63J-104N	RESISTOR
	R480	NRSA63J-104N	RESISTOR
	R482	QRD161J-102	RESISTOR
	C402	NCF31CZ-104A	CAPACITOR
	C403	QEF81CM-226	TANTAL CAPACITOR
	C404	NCF31CZ-104A	CAPACITOR
	C405	NCT07CH-180A	CAPACITOR
	C406	NCT07CH-220A	CAPACITOR
	C407	NCT07CH-220A	CAPACITOR
	C408	QEF80JM-476	TANTAL CAPACITOR,C408-2
	C409	ECEV0JV220R	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C410	QCFA1EZ-104	CAPACITOR
	C413	PU59758-105	CAPACITOR
	OR	QCF81CZ-105	CAPACITOR
	C414	ECEV1CV100R	E CAPACITOR
	OR	NEH31CM-106NZ	E CAPACITOR
	C415	ECEV0JV220R	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C416	NCT07CH-101A	CAPACITOR
	C417	NCF31CZ-104A	CAPACITOR
	C418	QEF80GM-226	TANTAL CAPACITOR
	OR	QEF80JM-226	TANTAL CAPACITOR
	C419	QEF80JM-106	TANTAL CAPACITOR
	C420	QEF80JM-475	TANTAL CAPACITOR
	C421	QEF81EM-474	TANTAL CAPACITOR
	C422	ECEV1CV100R	E CAPACITOR
	OR	NEH31CM-106NZ	E CAPACITOR
	C423	NCB31EK-103A	CAPACITOR
	C425	NCS31HK-221A	CAPACITOR
	C426	NCF31CZ-104A	CAPACITOR
	C427	NCF31CZ-104A	CAPACITOR
	C428	NCF31CZ-104A	CAPACITOR
	C429	NCF31CZ-104A	CAPACITOR
	C431	YU40470-104	CAPACITOR
	C432	NCF31CZ-104A	CAPACITOR
	C433	NCF31CZ-104A	CAPACITOR
	C434	NCB31EK-103A	CAPACITOR
	C435	NCB31EK-103A	CAPACITOR
	C437	NCB31EK-103A	CAPACITOR
	L401	YU40248-220KY	COIL
	L402	PU58201-120K	COIL
	L405	PU58201-120K	COIL
	L406	PU58201-120K	COIL
⚠	X401	YU40141	CRYSTAL RESONATOR
	CN401	YU40179-110	CAP HOUSING
	CN402	YU40108-10	CAP HOUSING
	CN403	YU40105-10	CAP HOUSING,(BOARD TO BOARD)
	CN404	YU40105-22	CAP HOUSING,(BOARD TO BOARD)
	CN405	YU40096-7	CAP HOUSING
	CN408	YU40096-10	CAP HOUSING
	CN409	YU40096-2R	CAP HOUSING
	CN410	YU40096-2R	CAP HOUSING
	CN411	YU40105-8	CAP HOUSING,(BOARD TO BOARD)
	CN412	YU40096-3Y	CAP HOUSING
	CN413	YU40096-3	CAP HOUSING

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* 20. FULL AUTO WHITE BOARD ASSEMBLY <25> *
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	PWBA	YB20031C-01-C	FAW BOARD ASSY
	IC501	VC2038	IC
	IC502	BA10324F	IC
	OR	UPC324G2	IC
	OR	XRA10324F	IC
	IC503	BA10324F	IC
	OR	UPC324G2	IC
	OR	XRA10324F	IC
	PD501	PD170V1	PHOTO DIODE
	R501	NRSA63J-154N	RESISTOR
	R502	NRSA63J-123N	RESISTOR
	R503	NVP1301-223N	V RESISTOR,AW INDOOR B
	R504	NRSA63J-563N	RESISTOR
	R505	NRSA63J-183N	RESISTOR
	R506	NVP1301-223N	V RESISTOR,AW INDOOR R
	R507	NRSA63J-563N	RESISTOR
	R508	NRSA63J-223N	RESISTOR
	R509	NRSA63J-683N	RESISTOR
	R511	NRSA63J-473N	RESISTOR
	R512	NRSA63J-473N	RESISTOR
	R513	NRSA63J-823N	RESISTOR
	R514	NRSA63J-0R0A	RESISTOR
	R515	NVP1301-473N	V RESISTOR, AW INDOOR R LIM
	R516	NRSA63J-473N	RESISTOR
	R518	NRSA63J-0R0A	RESISTOR
	R519	NVP1301-473N	V RESISTOR AW OUTDOOR R LIM
	R520	NRSA63J-473N	RESISTOR
	R522	QRSA08F-223YN	RESISTOR
	R523	NVP1301-473N	V RESISTOR,PRESET FL B
	R524	QRSA08F-513YN	RESISTOR
	R526	QRSA08J-0R0Y	RESISTOR
	R527	NVP1301-473N	V RESISTOR,OUTDOOR B
	R528	QRSA08J-473YN	RESISTOR
	R530	NRSA63J-0R0A	RESISTOR
	R531	NVP1301-473N	V RESISTOR AW OUTDOOR B LIM
	R532	NRSA63J-473N	RESISTOR
	R534	NRSA63J-0R0A	RESISTOR
	R535	NVP1301-473N	V RESISTOR, AW INDOOR B LIM
	R536	NRSA63J-473N	RESISTOR
	R538	QRSA08F-223YN	RESISTOR
	R539	NVP1301-473N	V RESISTOR,PRESET FL R
	R540	QRSA08F-433YN	RESISTOR
	R541	NRSA63J-0R0A	RESISTOR
	R542	QRSA08F-223YN	RESISTOR
	R544	QRSA08F-473YN	RESISTOR
	R546	QRSA08J-0R0Y	RESISTOR
	R547	NVP1301-473N	V RESISTOR,OUTDOOR R
	R548	QRSA08J-473YN	RESISTOR
	R550	QRSA08F-183YN	RESISTOR
	R552	QRSA08F-563YN	RESISTOR

#⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R554	NRSA63J-102N	RESISTOR
	R555	NRSA63J-182N	RESISTOR
	R556	NRSA63J-102N	RESISTOR
	R557	NRSA63J-122N	RESISTOR
	R558	NRSA63J-104N	RESISTOR
	R559	NVP1301-224N	V RESISTOR,AW OUTDOOR B
	R560	NRSA63J-102N	RESISTOR
	R561	NRSA63J-153N	RESISTOR
	R562	NRSA63J-153N	RESISTOR
	R563	NVP1301-224N	V RESISTOR,AW OUTDOOR R
	R564	NRSA63J-102N	RESISTOR
	R565	NRSA63J-104N	RESISTOR
	R566	NRSA63J-103N	RESISTOR
	R567	NRSA63J-103N	RESISTOR
	R572	NRSA63J-472N	RESISTOR
	R573	NRSA63J-0R0A	RESISTOR
	R574	NRSA63J-222N	RESISTOR
	R575	NRSA63J-0R0A	RESISTOR
	R576	NRSA63J-0R0A	RESISTOR
	R581	NRSA63J-101N	RESISTOR
	R582	NRSA63J-101N	RESISTOR
	C502	NCB31EK-103A	CAPACITOR
	C503	NEH11CM-106NZ	E CAPACITOR
	C504	NCB31HK-272A	CAPACITOR
	C505	NCB31HK-272A	CAPACITOR
	C506	NCB31HK-272A	CAPACITOR
	C507	NEH11CM-106NZ	E CAPACITOR
	C508	NCB31EK-103A	CAPACITOR
	C509	NEH10JM-226NZ	E CAPACITOR
	C510	NEH11EM-475NZ	E CAPACITOR
	C511	NEH11EM-475NZ	E CAPACITOR
	C516	NCB31EK-103A	CAPACITOR
	L501	PU58201-220K	COIL
	OR	YU40248-220KY	COIL
	SW501	PU57008	TACT SWITCH
	SW502	PU57008	TACT SWITCH
	FIL1	YQ40394	WHITE FILTER
	SLD1	YQ40395	SHIELD CASE
	SLD2	YQ40396	SHIELD PLATE
	CN501	YU40101-22	CAP HOUSING,(BOARD TO BOARD)
	CN502	YU40101-12	CAP HOUSING,(BOARD TO BOARD)
	CN503	YU40095-4	CAP HOUSING

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****
* 21. MIC AMP BOARD ASSEMBLY <26> *
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	PWBA	YB30030A-01-C	MIC AMP BOARD ASSY
	IC701	M5282FP	IC
	R701	NRSA63J-102N	RESISTOR
	R702	NRSA63J-562N	RESISTOR
	R703	NRSA63J-102N	RESISTOR
	R704	NRSA63J-473N	RESISTOR
	R705	NRSA63J-221N	RESISTOR
	R706	NRSA63J-223N	RESISTOR
	R708	NRSA63J-682N	RESISTOR
	R709	NRSA63J-103N	RESISTOR
	R711	NRSA63J-222N	RESISTOR
	R712	NRSA63J-0R0A	RESISTOR
	C701	ECEV1EV4R7R	E CAPACITOR
	OR	NEH31EM-475NZ	E CAPACITOR
	C702	ECEV1CV470P	E CAPACITOR
	C703	NEH10GM-476NZ	E CAPACITOR
	C704	NCT07CH-101A	CAPACITOR
	C705	ECEV1EV4R7R	E CAPACITOR
	OR	NEH31EM-475NZ	E CAPACITOR
	C706	NCB31HK-152A	CAPACITOR
	C707	ECEV1EV4R7R	E CAPACITOR
	OR	NEH31EM-475NZ	E CAPACITOR
	C708	ECEV1CV470P	E CAPACITOR

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* 22. INDICATOR-2 BOARD ASSEMBLY <28> *
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	PWBA	YB20077Y-01-C	INDICATOR-2 BOARD ASSY
	IC801	VC2081	IC
	IC802	M5M5256FP	IC
	OR	SRM20256LM	IC
	OR	M5M5256BFP-L	IC
	OR	M5M5256BFP-LL	IC
	OR	UPD43256GU	IC
	OR	UPD43256AGU	IC
	IC803	M54641FP	IC
	IC804	MN12821(QR)	IC
	Q801	2SA1532(BC)	TRANSISTOR
	D801	MA714	DIODE
	D802	MA141WA	DIODE
	D803	RD6.8ESB	ZENER DIODE
	R801	NVP1301-222N	V RESISTOR, TITLE OSC
	R802	NRSA63J-102N	RESISTOR
	R803	ERT-D2FGL601S	THERMISTOR
	R804	NRSA63J-151N	RESISTOR
	R805	NRSA63J-104N	RESISTOR
	R806	NRSA63J-104N	RESISTOR
	R811	NRSA63J-101N	RESISTOR
	R812	NRSA63J-101N	RESISTOR
	R813	NRSA63J-682N	RESISTOR
	R814	NRSA63J-472N	RESISTOR
	R815	NRSA63J-153N	RESISTOR
	R816	NRSA63J-103N	RESISTOR
	R820	NRSA63J-472N	RESISTOR
	R821	NRSA63J-225N	RESISTOR
	R825	NRSA63J-0R0A	RESISTOR
	R827	NRSA63J-0R0A	RESISTOR
	R828	NRSA63J-0R0A	RESISTOR
	R829	NRSA63J-471N	RESISTOR
	C802	QEF81CM-226	TANTAL CAPACITOR
	C803	NCT07CH-181A	CAPACITOR
	C804	ECEV1CV100R	E CAPACITOR
	OR	NEH31CM-106NZ	E CAPACITOR
	C805	ECEV0JV220R	E CAPACITOR
	OR	NEH30JM-226NZ	CAPACITOR
	C806	NCR21CM-473A	CAPACITOR
	C812	NCB31HK-391A	CAPACITOR
	C813	YU40470-104	CAPACITOR
	L801	PU58201-120K	COIL

#	REF NO.	PART NO.	PART NAME, DESCRIPTION
	L802	PU58201-120K	COIL
	SPC1	YQM30019-5	PAD
	SPC2	YQM30019-8	PAD
	CN801	YU40105-12	CAP HOUSING (BOARD TO BOARD)
	CN804	YU40096-4	CAP HOUSING
	CN805	YU40096-2	CAP HOUSING

****

****
* 23. SWITCH BOARD ASSEMBLY <28> *
****

	PWBA	YB20169A-02-C	SWITCH BOARD ASSY
	R901	QRSA08J-102YN	RESISTOR
	R902	QRSA08J-102YN	RESISTOR
	R903	QRSA08J-102YN	RESISTOR
	R904	QRSA08J-102YN	RESISTOR
	R905	QRSA08J-102YN	RESISTOR
	SW901	YU41095-Z	TACT SWITCH
	SW902	YU41095-Z	TACT SWITCH
	SW903	YU41095-Z	TACT SWITCH
	SW904	YU41095-Z	TACT SWITCH
	SW905	YU41095-Z	TACT SWITCH
	CN901	YU40095-6	CAP HOUSING

****

****
* 24. DRUM BOARD <31> *
****

	PWB	YDM3021-2	UPPER DRUM BOARD

****

****
* 25. LED BOARD <33> *
****

	PWB	YB40001	LED BOARD
	D1	SIM-20ST	LE DIODE

****

****
* 26. END SENSOR <34> *
****

	PHS	TPS605	PHOTO TRANSISTOR

#	REF NO.	PART NO.	PART NAME, DESCRIPTION

****

****
* 27. ELECTRICAL VIEWFINDER BOARD <50> *
****

⚠	PWBA	YU30181-012	E. VF BOARD ASSY
⚠	IC1	AN2512S	IC
	IC2	AN78L05	IC
	TR1	2SC2812	CHIP TRANSISTOR
	OR	2SD601A	CHIP TRANSISTOR
	OR	2SC2412K	CHIP TRANSISTOR
	OR	2SC2712	CHIP TRANSISTOR
	OR	2SC2462	CHIP TRANSISTOR
	OR	2SC3052	CHIP TRANSISTOR
⚠	TR2	2SD1665M	TRANSISTOR
⚠	OR	2SC3665	TRANSISTOR
⚠	OR	2SD774	TRANSISTOR
⚠	OR	2SD1815	TRANSISTOR
⚠	OR	2SD667A	TRANSISTOR
	D01	DC8010	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	OR	ISS184	CHIP DIODE
	OR	HSM2838	CHIP DIODE
	OR	MC2838	CHIP DIODE
	D02	ERA15-06	CIODE
	OR	DSA186	DIODE
	OR	RGP10G	DIODE
	D03	MA152WK	CHIP DIODE
	D04	ERA15-06	DIODE
	OR	DSA186	DIODE
	OR	RGP10G	DIODE
	D05	DC8010	CHIP DIODE
	OR	MA151WK	CHIP DIODE
	OR	DAN202K	CHIP DIODE
	OR	ISS184	CHIP DIODE
	OR	HSM2838	CHIP DIODE
	OR	MC2838	CHIP DIODE
	VR1	YU30181-502	CHIP RESISTOR, V SIZE
	VR2	YU30181-503	CHIP RESISTOR, H-HOLD
	VR3	YU30181-504	CHIP RESISTOR, CONT
	VR4	YU30181-505	CHIP RESISTOR, BRIGHT
	R01	QRSA08J-3R9	RESISTOR
	R02	QRSA08J-363	RESISTOR
	R03	–	–
	R04	QRSA08J-514	RESISTOR
	R05	–	–
	R06	QRSA08J-122	RESISTOR
	R07	QRSA08J-104	RESISTOR
	R08	QRSA08J-122	RESISTOR
	R09	QRSA08J-561	RESISTOR
	R10	QRSA08J-472	RESISTOR
	R11	–	–
	R12	–	–
	R13	–	–
	R14	QRSA08J-471	RESISTOR
	R15	QRSA08J-471	RESISTOR
	R16	QRSA08J-471	RESISTOR
	R20	QRSA08J-512	RESISTOR
	R21	QRSA08J-512	RESISTOR
	R22	QRSA08J-103	RESISTOR
	R23	QRSA08J-102	RESISTOR
	R24	QRSA08J-273	RESISTOR
	R25	–	–

⚠	REF NO.	PART NO.	PART NAME, DESCRIPTION
	R30	QRS188J-335	RESISTOR
	R31	QRS188J-335	RESISTOR
	R32	QRSA08J-332	RESISTOR
	R42	QRSA08J-125	RESISTOR
	R51	QRSA08J-180	RESISTOR
	C01	YU30181-506	TANTAL CAPACITOR
	C02	QCYA1EK-223	CHIP CAPACITOR
	C03	QEK41HM-105	CAPACITOR
	C04	QEK41HM-225	CAPACITOR
	C05	QEK41CM-106	CAPACITOR
	C06	–	–
	C07	–	–
	C08	–	–
	C09	–	–
	C10	QEK41AM-107	CAPACITOR
	C11	QEK40JM-227	CAPACITOR
	C12	QEK41AM-107	CAPACITOR
	C13	–	–
	C14	–	–
	C15	–	–
	C16	–	–
	C17	–	–
	C18	–	–
	C19	–	–
	C20	QCTA1CH-161	CHIP CAPACITOR
	C21	QEK41HM-335	CAPACITOR
	C24	QCFA1EZ-333	CHIP CAPACITOR
	C30	QCF81CZ-105	CAPACITOR
	C31	QEK41HM-335	CAPACITOR
	C32	YU30181-507	CAPACITOR (0.0022)
		OR YU30181-515	P.P CAPACITOR (0.0033)
		OR YU30181-516	P.P CAPACITOR (0.0036)
		OR YU30181-517	P.P CAPACITOR (0.0039)
		OR YU30181-518	P.P CAPACITOR (0.0043)
		OR YU30181-519	P.P CAPACITOR (0.0047)
	C33	PU59343	FILM CAPACITOR (1500P/400)
	RX	QRSA08J-200	CHIP RESISTOR
⚠	TF1	YU30181-508	THERMISTOR
	L01	YU30181-509	H.L.C
⚠	CP	ICP-N10	C. PROTECTOR
⚠	FBT	YU30181-510	F. BACK TRANS
	CN1	PU58656-5	CONNECTOR
	CN2	PU58656-4	CONNECTOR

SECTION 8
TECHNICAL INFORMATIONS

8.1 MECHACON CPU PIN FUNCTION

Pin No.	Label	IN/OUT	Note
1	FADER REQUEST (⎍⎍)	OUT	To IND
2	REC INDICATE (H)	OUT	To IND
3	TAPE END (H)	OUT	From 2 minutes before tape end / To IND
4	BATTERY ALARM (H)	OUT	When the supply voltage becomes 9.2 V / To IND
5	BATTERY CHECK	IN	9.2 V (ALARM), 8.8 V (POWER OFF / ANALOG INPUT
6	END SENSOR	IN	Detect the tape end / ANALOG INPUT
7	MECHA DATA B	IN	Detect the mechanism condition / ANALOG INPUT
8	MECHA DATA A	IN	Detect the mechanism condition / ANALOG INPUT
9	KEY B	IN	Operation keys input / ANALOG INPUT
10	KEY A	IN	Operation keys input / ANALOG INPUT
11	TRIGGER SW ON (L)	IN	
12	FULL ERASE HEAD ON (H)	OUT	
13	TEST 1	IN	When both High : NORM mode When both Low : EMERGENCY OFF mode
14	TEST 0	IN	When both High : NORM mode When both Low : EMERGENCY OFF mode
15	COUNTER OE (H)	OUT	For LCD
16	SERIAL CLOCK	IN	For LCD
17	SERIAL DATA	OUT	For LCD
18	FLYING ERASE HEAD ON (H)	OUT	
19	CAPSTAN FG	IN	BACK SPACE EDIT, SP/EP DET, TAPE END ALARM
20	POWER SW ON (L)	IN	
21	FADER MODE (H)	IN	
22	TRIGGER ALARM (⎍⎍)	OUT	
23	DRUM FF	IN	DRUM ROTATE DET, REC START TIMING, END LED ON TIMING
24	GND	–	
25	RESET (L)	IN	
26	X IN	IN	4 MHz CLOCK OSC
27	X OUT	OUT	4 MHz CLOCK OSC
28	NC	–	
29	GND	–	
30	HEAD SW PULSE D	IN	REC START TIMING
31	HEAD SW PULSE A	IN	REC START TIMING
32	CTL PULSE	IN	SP/EP DET, EDITING POINT DET
33	SUPPLY REEL FG	IN	SUPPLY REEL ROTATE DET, TAPE END ALARM DET
34	REMOTE	IN	SERIAL REMOTE PULSE INPUT from RM-V15
35	NTSC (L)/PAL (H)	IN	
36	CAM B	IN	Detect the mechanism mode
37	CAM A	IN	Detect the mechanism mode
38	REC CTL PULSE DUTY	OUT	65% (H)/55% (L)
39	CAPSTAN CONTROL	OUT	MECHACON (H)/SERVO (L)
40	SEARCH (H)	OUT	MODE: I / A; PB: L / L; INSERT: H / L; ASB: L / H; REC: H / H
41	SERVO MODE I	OUT	MODE: I / A; PB: L / L; INSERT: H / L; ASB: L / H; REC: H / H
42	SERVO MODE A	OUT	MODE: I / A; PB: L / L; INSERT: H / L; ASB: L / H; REC: H / H
43	AUDIO MUTE (H)	OUT	
44	AUDIO EE (H)	OUT	
45	PAUSE (H)	OUT	
46	AUDIO REC MUTE (L)	OUT	
47	CAMERA or PB (H)/EXT (L)	OUT	
48	DRUM ON (H)	OUT	After middle point
49	RETAKE REW (H)	OUT	
50	COUNTER OPERATE (L)	OUT	
51	COUNT UP (H)/DOWN (L)	OUT	
52	VIDEO REC MUTE (L)	OUT	
53	VIDEO MUTE (L)	OUT	
54	VIDEO REC (L)	OUT	
55	VIDEO PB (L)	OUT	
56	END LED (⎍⎍)	OUT	Pulse drive
57	AFTER LOADING (L)	OUT	Mode control motor drive voltage up
58	LOAD REV (H)	OUT	NORM: L / L; FWD: L / H; REV: H / L; BRAKE: H / H
59	LOAD FWD (H)	OUT	NORM: L / L; FWD: L / H; REV: H / L; BRAKE: H / H
60	V. PULSE ON (H)	OUT	SEARCH or STILL (H)
61	EP (H)/SP (L)	OUT	
62	REMOTE PAUSE (L)	OUT	For MASTER EDIT
63	CAPSTAN REV (L)	OUT	CAPSTAN MOTOR DIRECTION CONTROL
64	CAPSTAN FWD (L)	OUT	CAPSTAN MOTOR DIRECTION CONTROL
65	GND	–	
66	POWER ON (H)	OUT	
67	Vcc	–	
68	GND	–	
69	NC	–	
70	CAP MOTOR REF	OUT	
71	NC	–	
72	CAMERA POWER ON (H)	OUT	

Table 8-1 Mechacon CPU pin function

8-1

8.2 DIGITAL SERVO LSI

MODE				Pin No.
REC	ASB	INST	PB	
H	H	L	L	1
H	L	H	L	2

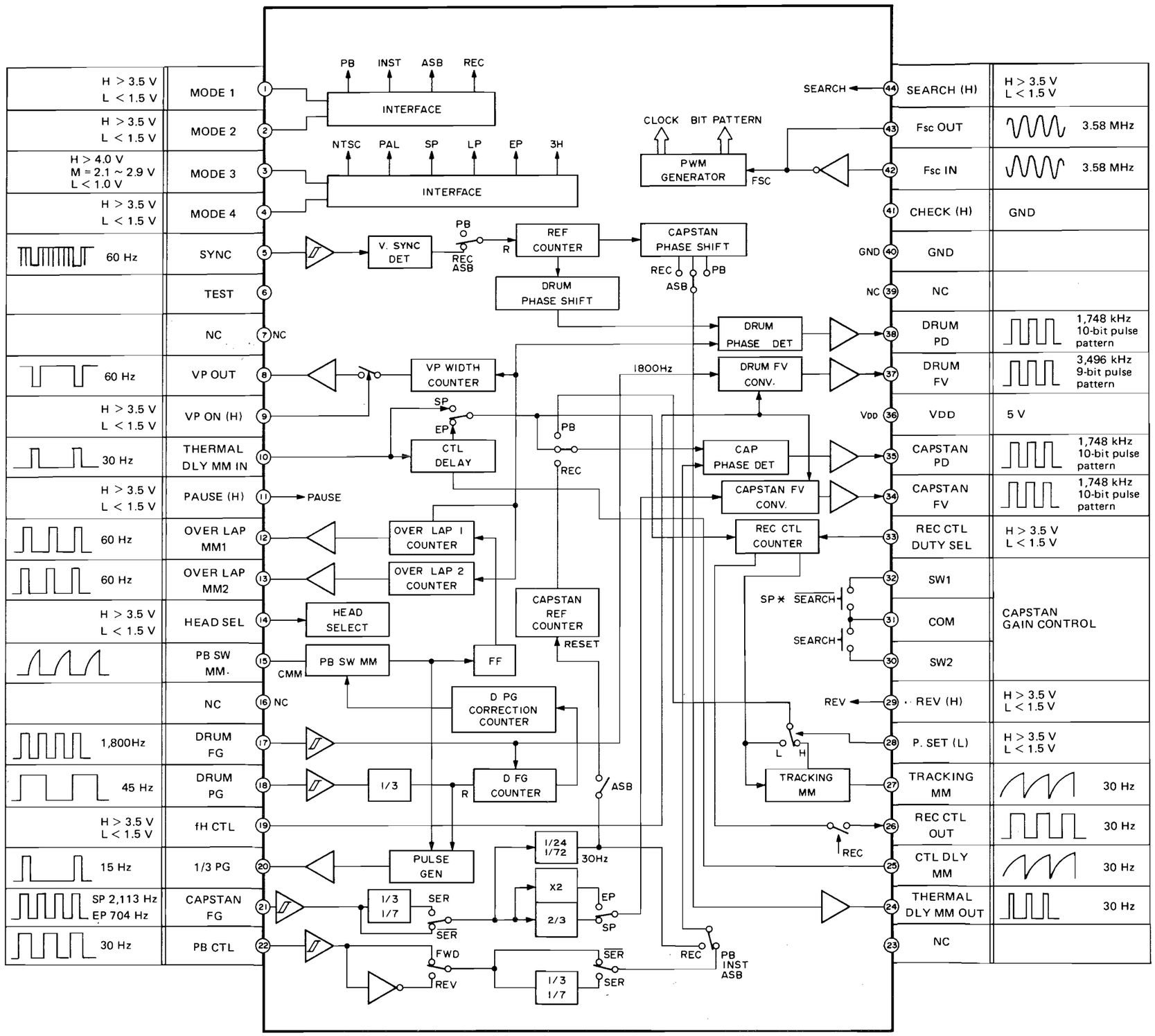
MODE						Pin No.
PAL		NTSC				
9H	3H	9H		3H		
LP	SP	EP	SP	EP	SP	
H	H	M	M	L	L	3
H	L	H	L	H	L	4

MODE	Pin No.
VP	
ON H	9
OFF L	

MODE	Pin No.
PAUSE	
ON H	11
OFF L	

MODE	Pin No.
HEAD SEL	
4 HEAD H	14
DA 8 L	

MODE	Pin No.
FH CTL	
FH ON H	19
FH OFF L	



Pin No.	MODE
	SEARCH
44	H SEARCH
	L NORM

Pin No.	MODE
	REC CTL DUTY
33	H 65%
	L 55%

Pin No.	MODE
	REV
29	H REV
	L NORM

Pin No.	MODE
	P. SET
28	H OFF
	L ON

Fig. 8-1 Digital servo LSI

8-2

8.3 INDICATOR I/O

PIN No.	LABEL	IN/OUT	CONTENTS
1	LLL	IN	Low : LOW LIGHT
2	CHARACTER	IN	WHITE BALANCE indication (Low : CHARACTER, High : ALPHABET)
3	NTSC/PAL	IN	Low : NTSC, High : PAL
4	TAPE END	IN	High : TAPE END
5	VIDEO REC	IN	Low : REC mode
6	SP/EP	IN	High : EP, Low : SP
7	VIDEO PB (L)	IN	Low : INDICATOR OFF
8	ALC	IN	Not used
9	RESET (L)	IN	
10	SMTH CHARACTER 1	OUT	CHARACTER OUTPUT for Electronic Viewfinder
11	FRINGE 1	OUT	Not used
12	FRINGE 2	OUT	FRINGE signal OUTPUT for DATE/TIME REC
13	SMTH CHARACTER 2	OUT	CHARACTER signal OUTPUT for DATE/TIME REC
14	CL 1	IN	
15	CL 2	IN	
16	STOP (L)	IN	High : CAMERA ON, Low : CAMERA OFF
17	CANCEL (L)	IN	Low : FADER CANCEL
18	CL 3	IN	
19	NC	–	
20	NC	–	
21	NC	–	
22	NC	–	
23	VD	IN	Vertical Drive Pulse
24	HD	IN	Horizontal Drive Pulse
25	V_{DD}	IN	5 V
26	OSC 1	IN	6 MHz
27	OSC 2	OUT	6 MHz
28	V_{SS} 1	IN	GND
29	V_{SS} 2	IN	BACK UP GND
30	V_{SS} 3	IN	CLOCK GND
31	X 1	IN	32 kHz
32	X 2	OUT	32 kHz
33	LAP RESET	IN	DATE UNIT : Low : REC TIME RESET button ON or CAMERA OFF
34	TIME REC ON/OFF	IN	Low : DATE/TIME REC button ON
35	REC SEL	IN	Low : DISPLAY SELECT button ON
36	ADJUST SEL	IN	Low : SELECT button ON
37	SET	IN	Low : DISPLAY SET button ON
38	LAP ON/OFF	IN	High : LAP indication, Low : No LAP indication
39	12H/24H	IN	High : 24H indication, Low : 12H indication
40	DATE 1	IN	DATE SELECT : 1 : Low, 2 : Low — 60 . 12 . 17 PM 3 : 30 / 1 : High, 2 : Low — 17 . 12 . 60 PM 3 : 30 / 1 : High, 2 : High — 12/17 . 60 PM 3 : 30 / 1 : Low, 2 : High — DEC. 17 : 60 PM 3 : 30
41	DATE 2	IN	
42	IND (H)	IN	"FADER" BLINK
43	MODE 1	IN	W.BAL.MODE FEEDBACK : 1 : Low, 2 : Low — INDOOR / 1 : Low, 2 : High — FL / 1 : High, 2 : Low — OUTDOOR / 1 : High, 2 : High — (AUTO)
44	MODE 2	IN	
45	FULL AUTO	IN	Low : FULL AUTO button ON
46	WHITE BALANCE	IN	Low : WHITE BALANCE SELECT
47	FOCUS	IN	Low : FOCUS button ON
48	SHUTTER	IN	Low : SHUTTER button ON
49	FADER	IN	Low : FADER button ON
50	P1	IN	
51	FADER	OUT	High : FADER reserved
52	NC	–	
53	NC	–	
54	SHUTTER 1	OUT	SHUTTER MODE SET : 1 : Low, 2 : Low — STANDARD / 1 : Low, 2 : High — 1/250 / 1 : High, 2 : Low — 1/500 / 1 : High, 2 : High — 1/1000
55	SHUTTER 2	OUT	
56	WBO 1	OUT	W. BAL. MODE SET : 1 : Low, 2 : Low — INDOOR / 1 : Low, 2 : High — FL / 1 : High, 2 : Low — OUTDOOR / 1 : High, 2 : High — AUTO
57	WBO 2	OUT	
58	AUTO FOCUS	OUT	High : AUTO FOCUS
59	NC	–	
60	P2	IN	
61	FRONT FOCUS	IN	
62	CENTER FOCUS	IN	
63	BACK FOCUS	IN	
64	BATTERY	IN	High : BATTERY ALARM

CL1	CL2	CL3	COLOR
H	H	H	WHT
H	H	L	YEL
H	L	H	CYAN
H	L	L	GRN
L	H	H	PURP
L	H	L	RED
L	L	H	BLUE
L	L	L	BLK

▶■◀	◀	▶	■	P1	P2	Page
				L	L	P1
H	H	L	H	H	L	P2
H	H	H	L	L	H	P3
H	L	H	H	H	H	P4

Table 8-2 IND controller pin functions

ELECTRONIC VIEWFINDER DISPLAY		LABEL / IC301 PIN NO.	BLINK (2 Hz)	BLINK (1 Hz)	CAM EE	IND	FAD 0	SHUTTER 2	SHUTTER 1	LAP	SP/EP	V. REC	TAPE END	NTSC/PAL	CHARACTER	WBO B	WBO A	LLL	BATTERY	AUTO FOCUS	FRONT FOCUS	CENTER FOCUS	BACK FOCUS	P2	P1	CL3	CL2	CL1
			–	–	7	42	51	55	54	38	6	5	4	3	2	57	56	1	64	58	61	62	63	59	63	18	15	14
FOCUS	■				H															L	H	L	H					
	▶				H															L	H	H	L					
	◀				H															L	L	H	H					
	▶■◀			○	H															L	H	H	H					
	(AUTO)				H															H								
– BATTERY – LIGHT				○	H													L	H									
				○	H																							
W. BALANCE					H										L	L	L											
					H										L	H	L											
					H										L	L	H											
	INDOOR				H										H	L	L											
	FL LAMP				H										H	H	L											
	OUTDOOR				H										H	L	H											
	(AUTO)															H	H											
DECK MODE	REC				H						H	L	L															
	—				H						H	H	L															
	REC	○			H						H	L	H															
	EP REC				H						L	L	L	L														
	EP —				H						L	H	L	L														
	EP REC	○			H						L	L	H	L														
	LP REC				H						L	L	L	H														
	LP —				H						L	H	L	H														
	LP REC	○			H						L	L	H	H														
LAP	1 : 23 : 45				H					H																		
FADER	FADER				H		H																					
	FADER	○			H	H	⋕																					
SHUTTER	S1000				H			H	H																			
	S500				H			L	H																			
	S250				H			H	L																			
	(STD)				H			L	L																			
SUPERIMPOSE	P1																							L	L			
	P2																							H	L			
	P3																							L	H			
	P4																							H	H			
	WHT																									H	H	H
	YEL																									L	H	H
	CYAN																									H	L	H
	GRN																									L	L	H
	PURP																									H	H	L
	RED																									L	H	L
	BLUE																									H	L	L
	BLK																									L	L	L

Table 8-3 Electronic viewfinder display

SECTION 9
SERVICE GUIDE

9.1 EMERGENCY MODE TABLE

Display (Flash)	Symptom	Mode when observecl	Resulting mode
▶▶	P.B. CTL pulse input absent	During Zero Frame Editing	STOP
◀◀	–	–	–
▶ ▶▶	Drum flipflop input absent	Drum rotation, Zero Frame Editing	STOP
◀◀ ▶	Reel sensor input absent	PB, REC, SEARCH FF	STOP
▶❙❙	Loading motor rotates for more than 10 sec without shift to next mode	Loading, Unloading	Mode continues

Emergency mode : Indication for 5 minutes, then power OFF (power not turned OFF when using AC adapter)
Port states : Same as Stop mode
Effective key : POWER
Shifted mode : Power OFF
No. 6 : Emergency shut-off can be used for short test, etc.
Emergency input is "H" at EMG terminal.
Power OFF in all modes and all I/O are initialized.

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